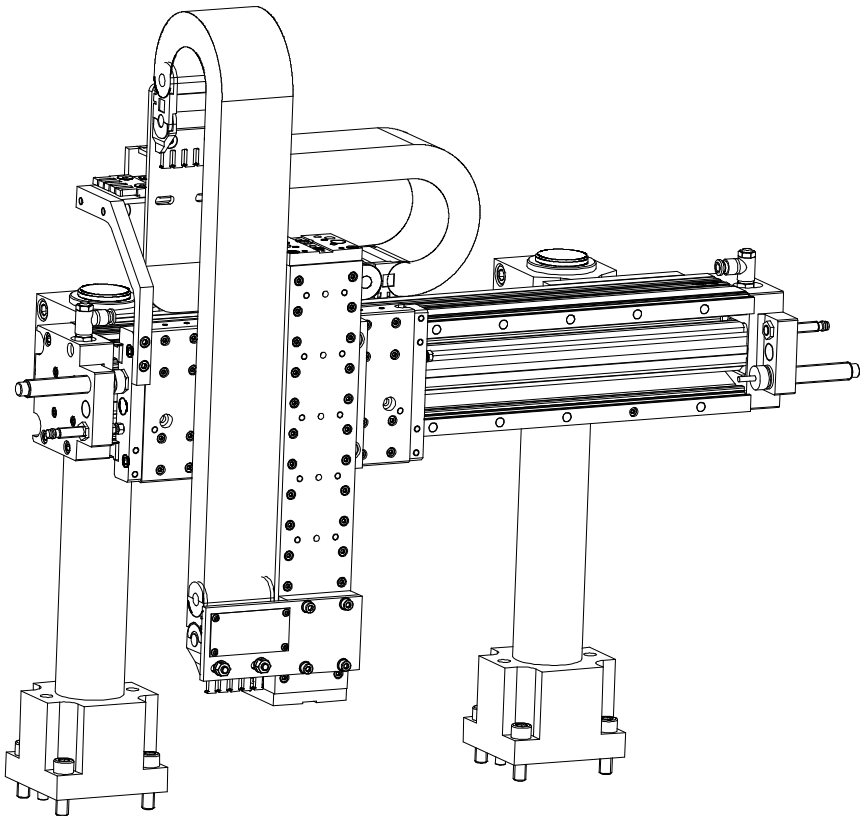
Linearportal pneumatic
LPP 050

Assembly- and Operating manual



Translation of the original manual

Dear Customer,

Congratulations on choosing a SCHUNK product. By choosing SCHUNK, you have opted for the highest precision, top quality and best service.

You are going to increase the process reliability of your production and achieve best machining results – to the customer's complete satisfaction.

SCHUNK products are inspiring.

Our detailed assembly and operation manual will support you.

Do you have further questions? You may contact us at any time – even after purchase. You can reach us directly at the mentioned addresses in the last chapter of these instructions.

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1 About this manual

1.1 Purpose/validity

This manual is part of the module and describes the safe and proper assembling.

This manual is valid only for the module specified on the front page.

1.2 Target groups

Target group	Task
Manufacturer, operator	➔ Keep this manual available for the personnel at all times. ➔ Require personnel to read and observe this manual and the applicable documents, especially the safety notes and warnings.
Skilled personnel, fitter	➔ Read, observe and follow this manual and the applicable documents, especially the safety notes and warnings.

Tab. 1

1.3 Applicable documents

Detailed device documentation is included in the unit's scope of delivery:

Document	Purpose	See
Component documentation	Technical data or application parameters of individual components and information about maintenance and repair and troubleshooting	Chapter 9, page 21

Tab. 2

1.4 Symbols in this manual

To give you quick access to information, the following symbols will be used in this guide:

Symbol	Meaning
⚠ **DANGER**	Dangers for persons. Nonobservance causes death or serious injuries.
⚠ **WARNING**	Dangers for persons. Nonobservance causes death or serious injuries.
⚠ **CAUTION**	Dangers for persons. Nonobservance can cause slight injuries.
NOTICE	Information on avoiding material damage.
➔	Handling instruction, also measures in a warning or note.

Tab. 3

1.5 Copyright

This manual remains the copyrighted property of SCHUNK GmbH & Co. KG. It is solely supplied to our customers and operators of our products and forms part of the unit.

This documentation may not be duplicated or made accessible to third parties, in particular competitive companies, without our prior permission.

1.6 Technical changes

We reserve the right to make alterations for the purpose of technical improvement.

2 Basic safety notes

2.1 Intended use

The unit is to be used only for the application contractually agreed between the manufacturer/supplier and user.

The unit is intended for installation in a machine/system. The requirements of the applicable guidelines must be observed and complied with.

The unit may be used only in the context of its defined application parameters.

To use this unit as intended, it is also essential to observe the technical data and installation and operation notes in this manual and to comply with the maintenance intervals.

Any other use or use exceeding that specified is an infringement of use for intended purpose. The manufacturer bears no liability for damage resulting from such use.

Use which is not specified as an intended use is for instance when

- the unit is used with machines/systems or workpieces that are not designed to be used with the unit.
- the unit is operated without protective equipment in accordance to the EC Machinery Directive.
- the statutory safety and accident-prevention regulations and the standards and guidelines valid at the usage site are not observed.

2.2 Controlled production

The unit represents the state of the art and the recognized safety rules at the time of delivery. However, it can present risks if, for example:

- The unit is not used in accordance with its intended purpose.
- The unit is not installed or maintained properly.
- The EC Machinery Directive, the VDE directives, the safety, accident-prevention regulations and environmental protection regulations valid at the usage site, or the safety and installation notes are not observed.

➔ The unit must only be used when in technically perfect condition and in accordance with its designated use and the instructions set out in the operating manual, and only by safety-conscious persons who are fully aware of the risks involved in operating the unit.

➔ Immediately remedy faults that could impair safety.

➔ In addition to this manual, statutory and other safety and accident-prevention regulations and the standards and guidelines valid at the usage site must be complied with.

2.2.1 Protective equipment

When the unit is in use, when in rotation and when it is stationary, protective equipment must be used to catch flying parts should the unit or part of the unit fail.

The protective equipment must comply with EC Machinery Directive requirements.

The machine/system manufacturer must ensure that the wall thickness in the machine’s paneling is adequate and must not use polycarbonate glass for protective windows, because this may cause a threat to the life and limb of the operator if the component should break.

2.2.2 Constructional changes, attachments, or modifications

Modifications, additions and conversions which could impair safety may not be made to the unit without SCHUNK's permission.

Non-authorized modifications results in the exclusion from product liability.

2.2.3 Spare parts

Spare parts must meet the requirements of the manufacturer and/or the supplier. This can always be guaranteed with original spare parts.

Improper repair as well as use of non-original spare parts results in the exclusion from product liability.

2.3 Obligations of the manufacturer/operator

2.3.1 Choice of personnel and personnel qualifications

Work on the unit may only be carried out by reliable personnel. The legal minimum age must be observed.

The assembly, commissioning, maintenance, and repair of the unit may be performed only by trained specialist personnel who have been shown how to perform the said work activities.

The manufacturer/operator must ensure that the personnel are adequately and appropriately trained to perform the work on the unit allocated to them.

Every person called upon by the operator to work on the unit must have read and understood the complete Assembly and Operating Manual, especially chapter 2"Basic safety notes". This applies particularly to occasional personnel such as maintenance personnel.

We recommend that the manufacturer/operator require employees to sign that they have read and understood the Assembly and Operating Manual.

Furthermore we recommend that the manufacturer/operator require employees to sign that they have participated in training courses.

In addition to this manual, the statutory and other safety and accident-prevention regulations and the standards and guidelines valid at the usage site must be complied with.

We recommend that the manufacturer/operator issue in-house operating instructions which take into account the known qualifications of the operating personnel.

- ➔ Only employ trained personnel who have been shown how to perform the work activities. If necessary, make use of the manufacturer's training programmes.
- ➔ Personnel requiring training and instruction or those who are already receiving training and instruction must be supervised on the unit by skilled personnel.
- ➔ Define areas of responsibility of the personnel. Enable personnel to refuse instructions issued by third parties which breach safety regulations.

2.3.2 Organizational measures

- ➔ Ensure that at least one copy of this manual is kept in the direct vicinity of the machine/system where the unit is installed, and that it is accessible for the relevant persons.
- ➔ Ensure that personnel have read and understood this manual, especially chapter 2"Basic safety notes
- ➔ Provide instruction about and observe the safety and accident-prevention regulations valid at the usage site.
- ➔ Provide instruction about and observe the environmental protection regulations valid at the usage site.
- ➔ Ensure that the safety and hazard warning signs on the machine/system are observed and that the signs are clearly legible.
- ➔ Provide protective equipment.
- ➔ Check the personnel's conduct regarding awareness of safety and hazards from time to time.

2.3.3 Disposal

- ➔ Send unit components for recycling or properly dispose of them according to local regulations.

2.4 Personnel responsibilities

2.4.1 Safety-conscious working

- ➔ Avoid any manner of working that may interfere with the function and operational safety of the unit.
- ➔ Observe the safety and accident-prevention regulations valid at the usage site.
- ➔ Observe the environmental protection regulations valid at the usage site.
- ➔ Wear protective equipment.

2.4.2 Safety measures during transport

- ➔ Observe safety measures during the transport and handling of very heavy units.

2.4.3 Safety measures during operation

- ➔ Only operate the unit when all protective equipment has been fitted and is in full working order.
- ➔ Check the unit at least once per shift for externally visible damage and faults.
- ➔ Report any changes including changes in operational behaviour to the responsible place/persons immediately. If necessary immediately shut down and lock out the machine/system.

2.4.4 Behaviour in the event of faults and/or emergencies

If faults on the unit occur which could impair safety or the operational behaviour indicates the occurrence of a fault:

- ➔ Shut the machine/system down immediately, lock out and report the fault to the responsible place/persons.
- ➔ Faults may be eliminated by trained and authorized personnel only.
- ➔ Only restart the machine/system when the cause of the fault has been eliminated.

2.4.5 Testing/inspections

- ➔ Observe the stipulated periods for regular tests and inspections.

2.5 Notes on particular risks

Risk of injury when the machine/system moves unexpectedly!

➔ Remove the energy supplies before installation, modification, maintenance, or adjustment work.

➔ Make sure that there is no more residual energy in the system.

➔ Perform maintenance, modifications, and additions outside the danger zone.

➔ For all work, secure the unit against accidental operation.

Risk of injury from falling of the unit during transport and assembly!

➔ Secure unit during transport and assembly with adequately sized straps.

➔ Mount the unit, so that it will cause no harm by tilting over or falling down.

Risk of injury due to uncontrolled movements of the unit when malfunction of the sensors, pneumatic valves and electrical distribution panelboard.

➔ Observe the correct connection of the sensors, pneumatic valves and electrical distributors.

Risk of injury due to squeezing and clamping between the slide and the base plate during movement of the module!

➔ Remove the energy supplies before installation, modification, maintenance, or adjustment work.

➔ Make sure that there is no more residual energy in the system.

➔ Perform maintenance, modifications, and additions outside the danger zone.

➔ For all work, secure the unit against accidental operation.

➔ The danger zone must be surrounded by a safety fence during operation.

3 Warranty

The warranty is valid for 24 months from the delivery date to the production facility under the following conditions:

- Intended use in 1-shift operation
- Observation of the maintenance and lubrication intervals (see Documentations of the components)

Parts touching the workpiece and wearing parts are not part of the warranty. Also observe our general terms of business.

The warranty does not cover:

- Damage occurring as a result of incorrect operation.
- Claims under warranty are excluded when repair or intervention is carried out by persons not authorized to do so.
- This also applies if accessories and spare parts are used which are not designed for our unit

4 Technical Data

Reference value	Value
permissible ambient temperature [C]	5° to +60°
permissible payload [kg]	5
IP rating	IP40
pressure medium	Compressed air, standards for quality of the compressed air according to ISO 8573-1: 6 4 4
Operating pressure [bar]	2 - 8
Noise level [dB(A)]	≤ 70

Tab. 4

Note
Additional technical data contain the documentations of the components in the Appendix.

5 Configuration

The unit consists of following components:

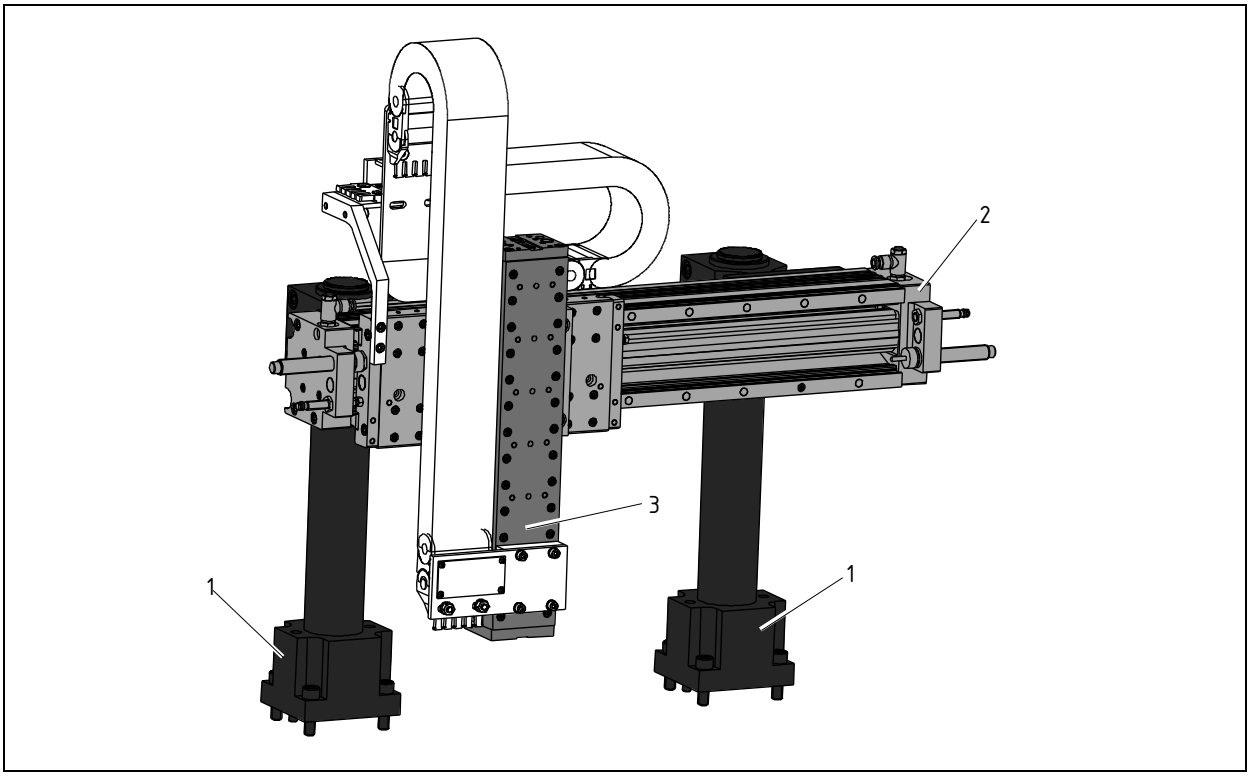

Fig. 1

Item	Designation	See
1	Pillar Assembly system	Documentation „Assembly system“, Appendix 5
2	Portal actuator PMP -25 with 2x proximity switchIN 30	Documentation „Portal actuator PMP“, Appendix 1 Documentation „Sensorik“, Appendix 4
3	for Units with stroke up to 100 mm Linear actuator CLM 100 for Units with stroke up to 225 mm Linear actuator LM 100 with 2x Promixity switch IN 30	Documentation „Linear actuator LM“, Appendix 2 Documentation „Linear actuator CLM“, Appendix 3 Documentation „Sensors“, Appendix 4

Table 5

6 Assembly and initial operation

6.1 Mechanical connection

⚠ WARNING

Risk of injury when the machine/system moves unexpectedly!

➔ Switch off power supply.

➔ Make sure that there is no more residual energy in the system.

⚠ WARNING

Risk of injury from falling of the unit during assembly

➔ Secure the gripping unit during assembly with adequately sized straps.

➔ Note the tightening torque of fixing screws.

⚠ WARNING

Risk of injury when the machine/system moves unexpectedly, by moving of the linear actuator or the portal actuator

➔ Switch off power supply before assembly and maintenance.

➔ Make sure that there is no more residual energy in the system.

The unit can be mounted by a pillar assembly system Ø 55 or directly on the portal actuator PMP.

- Information and dimensional drawings for mounting the pillar assembly system contains the documentation of the pillar assembly system in Appendix 5
- Information for mounting the portal actuator PMP contains the documentation of the portal actuator PMP in Appendix 1

6.2 Air connection / energy supply

⚠ WARNING

Risk of injury when the machine/system moves unexpectedly!

➔ Switch off power supply.

➔ Make sure that there is no more residual energy in the system.

⚠ WARNING

Risk of injury from objects falling during energy supply failure!

➔ Observe the requirements for the compressed air supply (see Documentation of the swivel and linear unit).

➔ Make sure that there is no more residual energy in the system.

Information on the air supply/energy supply contains:

- Documentation „Portal actuator PMP“ (Appendix 1)
- Documentation „Linear actuator LM“ (Appendix 2)
- Documentation „Linear actuator CLM“ (Appendix 3)

6.3 Connection of Sensors

⚠ WARNING

Risk of injury when the machine/system moves unexpectedly!

➔ Switch off power supply.

➔ Make sure that there is no more residual energy in the system.

⚠ WARNING

Risk of injury due to electrical energy.

➔ Switch off power supply.

Information on connection und handling of sensors contains:

- Documentation „Proximity switch IN“ (Appendix 4)

6.4 Assembly of handling modules

⚠ WARNING

Risk of injury when the machine/system moves unexpectedly!

➔ Switch off power supply.

➔ Make sure that there is no more residual energy in the system.

Notes

- Do not contribute any excessive forces and torques during assembly of loads.
- The evenness of the mounting surface must be less than 0.02 mm.
- Choose a proper connection, with a load that has his own guide mechanism and align them adequately.
- Avoid contact with the linear gantry during operation.
- Select appropriate tightening torques for the assembly of the gantry module or loads at the gantry module in accordance with the general guidelines for screw connections.

7 Maintenance and repair

⚠ WARNING

Risk of injury when the machine/system moves unexpectedly!

Due to movement of the axis!

➔ Remove the energy supplies before maintenance.

➔ Make sure that there is no more residual energy in the system.

➔ Perform maintenance outside the danger zone.

⚠ CAUTION

Allergic reactions due to grease in contact with skin!

➔ Wear gloves.

Maintenance interval

Weekly examination on easily visible damages or wear, or contamintion of the system.

The maintenance intervals apply to the single components according their servicing manuals.

The component documentation contains maintenance and repair information.

Components	see
Portal actuator PMP	Operating manual PMP, page 13 Appendix 1
Linear actuator LM	Operating manual LM, page 12 Appendix 2
Linear actuator CLM	Operating manual LM, page 10 Appendix 3
Proximity switch IN	No maintenance
Pillar assembly system	No maintenance

Tab. 6

8 Troubleshooting

The component documentation contains troubleshooting information.

9 Component documentation

The scope of delivery includes the documentation for the following components: (see CD-ROM, Appendix 1-5):

Components	Appendix
Portal actuator PMP	1
Linear actuator LM	2
Linear actuator CLM	3
Proximity switch IN	4
Pillar assembly system	5

Tab. 7

10 Translation of original EC declaration of incorporation

In terms of the EC Machinery Directive 2006/42/EC, annex II B

Manufacturer/ distributor	SCHUNK GmbH & Co. KG. Spann- und Greiftechnik Bahnhofstr. 106 – 134 D-74348 Lauffen/Neckar

We hereby declare that the following product:

Product designation:	Linearportal pneumatic
ID number:	381000 … 381233

meets the applicable basic requirements of the Directive Machinery (2006/42/EC).

The incomplete machine may not be put into operation until conformity of the machine into which the incomplete machine is to be installed with the provisions of the Machinery Directive (2006/42/EC) is confirmed.

Applied harmonized standards, especially:

EN ISO 12100-1	Safety of machines - Basic concepts, general principles for design -- Part 1: Basic terminology, methodology
EN ISO 12100-2	Safety of machines - Basic concepts, general principles for design -- Part 2: Technical principles

The manufacturer agrees to forward on demand the special technical documents for the incomplete machine to state offices.

The special technical documents according to Annex VII, Part B, belonging to the incomplete machine have been created.

Person responsible for documentation: Mr. Michael Eckert, Tel.: +49(0)7133/103-2204

Location, date/signature: Hausen, Januar 2011 i.V.

Title of the signatory Director for Development

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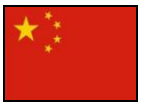

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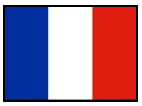

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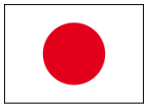

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Appendix 1

Portal actuator PMP

Portal module

With integrated pneumatic drive cylinder and pre-loaded recirculating ball-bearing guides with no backlash

Area of application

For economical, robust and precise portal systems with long stroke range. Use in dirty environments is also possible due to the "Bellow" option. Standardized connecting elements permit numerous combinations with other GEMOTEC system elements.

Advantages – your benefits

High moment load capacity
Through use of high-performance profiled rail guides

High degree of rigidity
Thanks to special extruded profile geometry

High precision
Through machined locating surfaces for the guide

Economical complete solutions
Thanks to numerous axis combination possibilities

Numerous options
(cable drag chain, bellow, intermediate position, etc.) for special optimization to fit your particular application

Standardized mounting bores
For numerous combinations with other GEMOTEC system elements

General information about the series

Guidance
Recirculating ball-bearing guide

Material
Aluminum extruded section; hardened steel functional components

Actuation
Pneumatic, via filtered compressed air (10 µm): dry, lubricated, or non-lubricated
Pressurizing medium: requirements for compressed air quality class according to DIN ISO 8573-1: Quality class 4

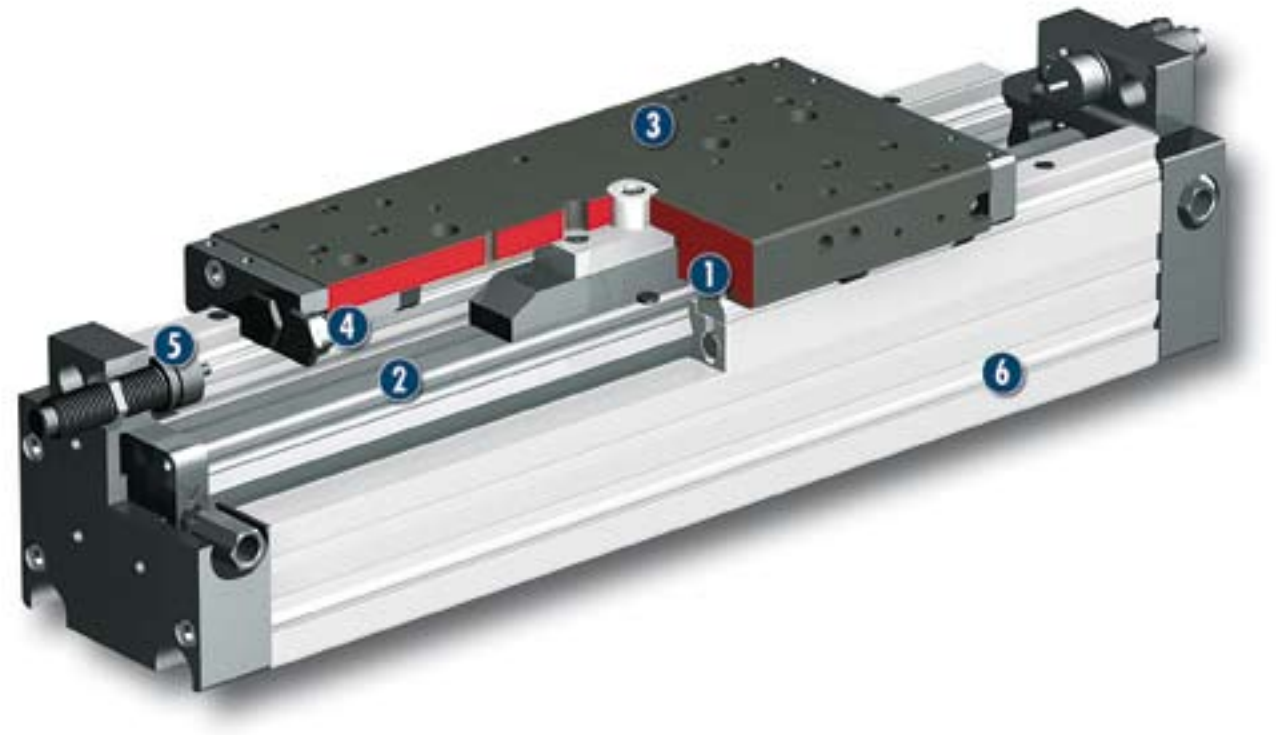
Ambient temperature range
From 5°C to 60°C

Operating pressure range
2 bar to 8 bar

Warranty
24 months

For production reasons, the colors may vary from those shown in the catalog.

Cross-section of function



1 **Profiled rail guide**
For maximum positioning accuracy and moment loads

2 **Drive**
Rodless cylinder; simple and yet reliable

3 **Modular design hole pattern**
Completely integrated in the module system

4 **Dampening adjustment**
Adjustment of the dampening characteristic

5 **End position setting**
Convenient adjustment using the shock absorber threads

6 **Profile**
Self-supporting and robust

Description of function

The axis carriage is driven by a rodless pneumatic cylinder and precisely guided by profiled rail guides.

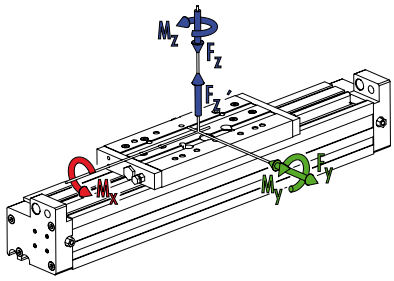
Options and special information

Bellow version
Increased degree of protection against penetrating materials; for use in dirty environments.

This module can be combined as standard with many elements from the modular system. You can find more information in the “Accessories” chapter.

PMP 25

Moment load



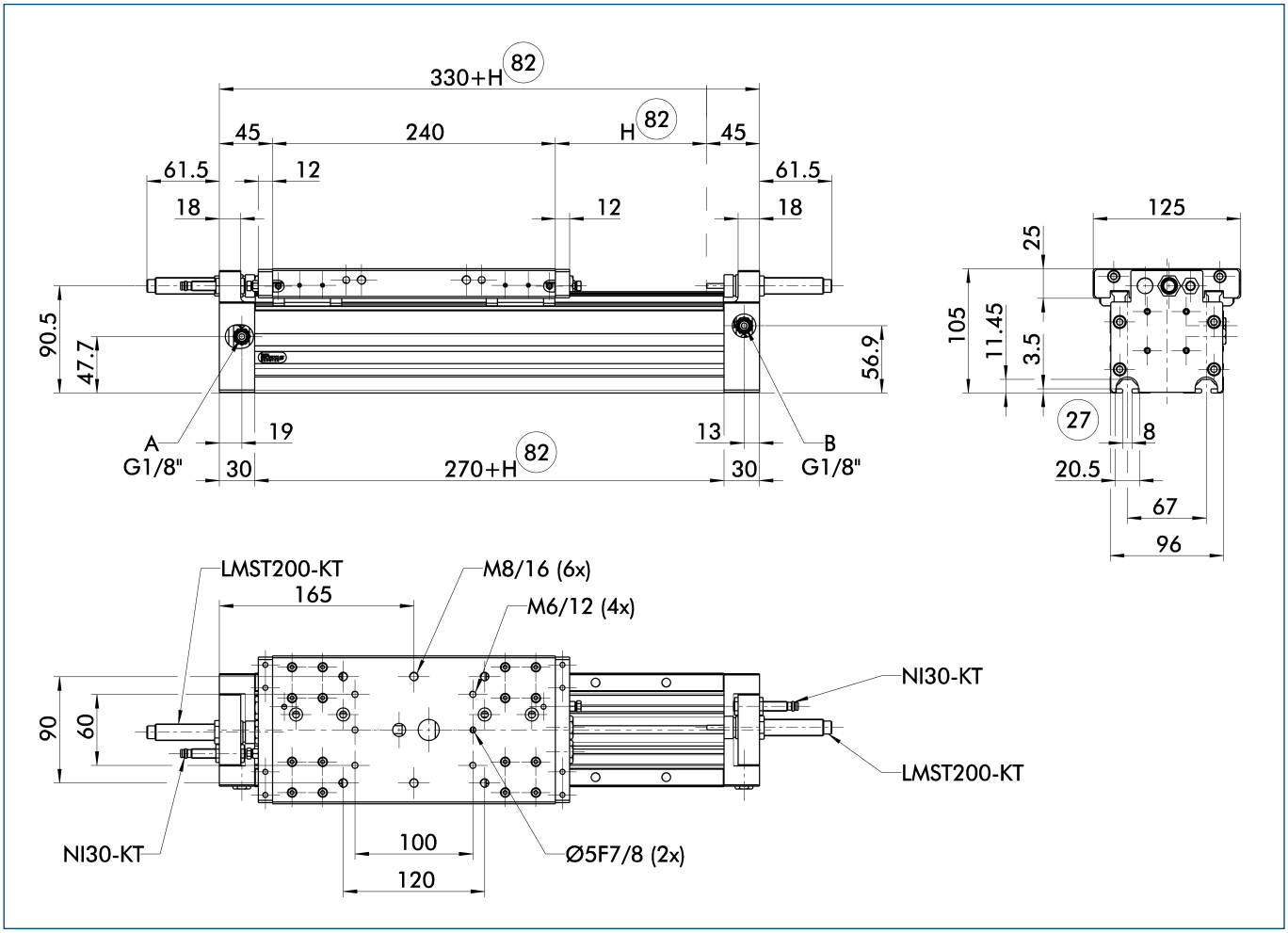
- M_x max. 250 Nm
- M_y max. 500 Nm
- F_y max. 4200 N
- M_z max. 500 Nm
- F_z max. 4200 N

ⓘ Moments and forces may occur simultaneously.

Technical data

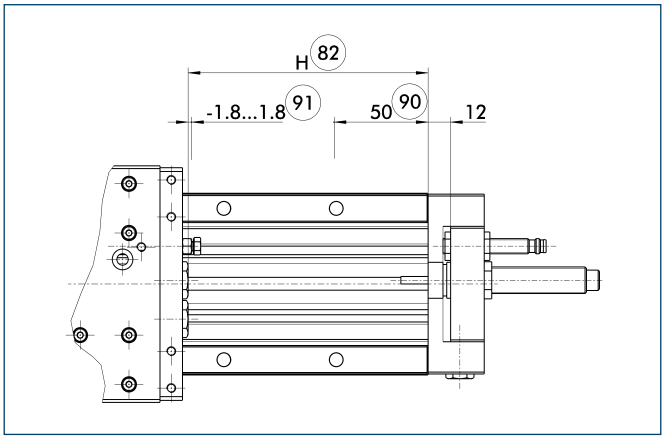
Designation		PMP 25
Piston diameter	[mm]	25
Max. stroke length	[mm]	5000
Feeding force at 6 bar	[N]	250
Mass at 0 mm stroke	[kg]	6.1
Mass per 1 mm stroke	[kg]	0.0103
Fluid consumption/10 mm stroke	[cm³]	4.9
Minimum pressure	[bar]	3
Maximum pressure	[bar]	10
Nominal operating pressure	[bar]	6
Min. ambient temperature	[°C]	5
Max. ambient temperature	[°C]	60
Repeat accuracy	[mm]	± 0.02

Main views



A, a Main and direct connections, extend linear unit
B, b Main and direct connections, retract linear unit
(27) Mounting groove for T-nuts
(82) Stroke

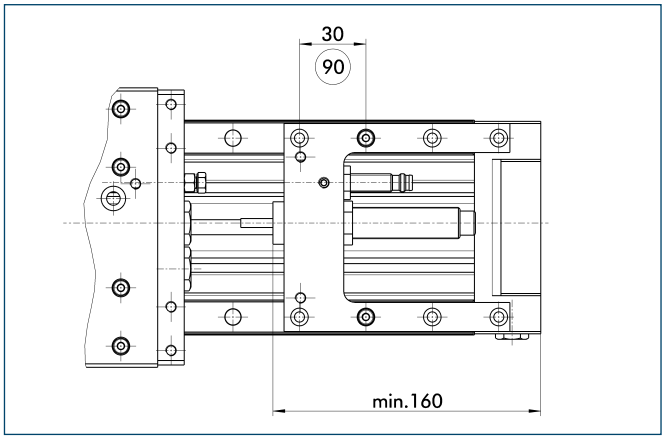
Stroke adjustment



(82) Stroke
(90) Stroke adjustment range
(91) Dampening stroke adjustment range

The nominal stroke for each end position can be finely adjusted by screwing out the shock absorber.

Variable final stop, VE

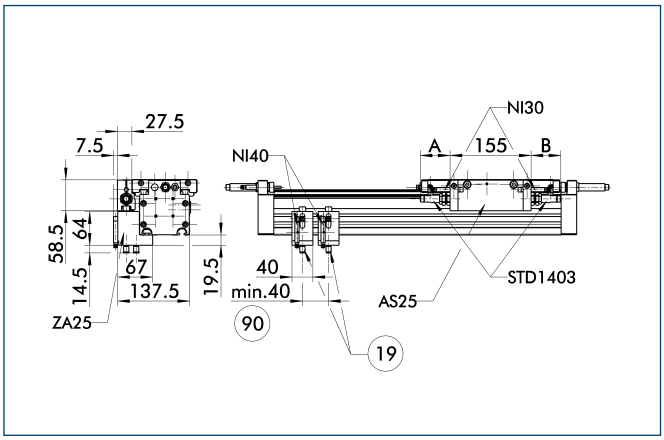


(90) Grid dimension, stroke adjustment (continuous fine adjustment; see stroke adjustment illustration)

With the variable end stop, the end positions can be continuously set over the whole length of the stroke to, for example, arrange for profile lengths to be independent of actual used stroke. Additional carrier profiles are then not needed.

Designation	ID
VE 25	0313610

Stop slide/intermediate stop

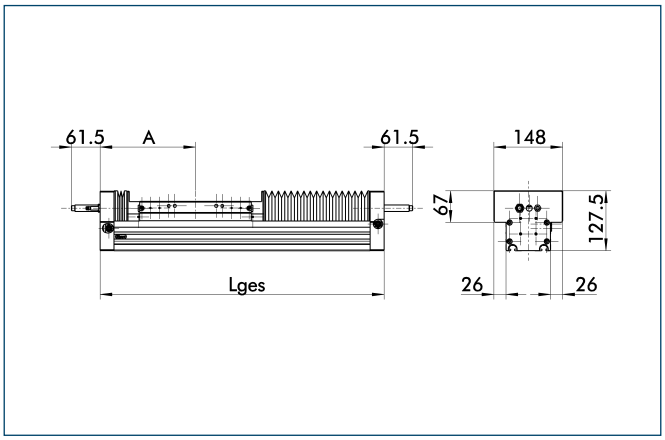


(19) Air connection
(90) Minimum distance between the intermediate stops, ZA

By assembling AS and ZA, several intermediate positions can be achieved. For the AS 25-1 stop slide, the intermediate position can only be approached from one side. For the AS 25-2 stop slide, the intermediate position can be approached from both sides. It is also possible to attach two stop slides to the main slide. This allows intermediate positions to be set in distances if 1 mm or less. The first intermediate position at least 30 mm before the end position.

Designation	A	B	Number of shock absorbers
AS 25-1	6	57	1
AS 25-2	57	57	2

Bellow



The "Bellow" option increases the degree of protection against penetrating materials. The variable dimensions are calculated as follows:

Formulas for calculation of variable dimensions:
FZ = nominal stroke x 0.0288 [rounded off to the nearest whole number]
FBB = FZ x 3.3 [rounded off to the nearest whole number]
Lges = 370 + nominal stroke + 2 x FBB
A = 185 + FBB

Sample calculation; nominal stroke, 500 mm:
FZ = 500 mm x 0.0288 = 14.4 => FZ = 15 [rounded off to the nearest whole number]
FBB = 15 x 3.3 = 49.5 => FBB = 50 [rounded off to the nearest whole number]
Lges = 370 + 500 mm + 2 x 50 => **Lges = 970 mm**
A = 185 + 50 => **A = 235 mm**

Cable track KSH, horizontal slide

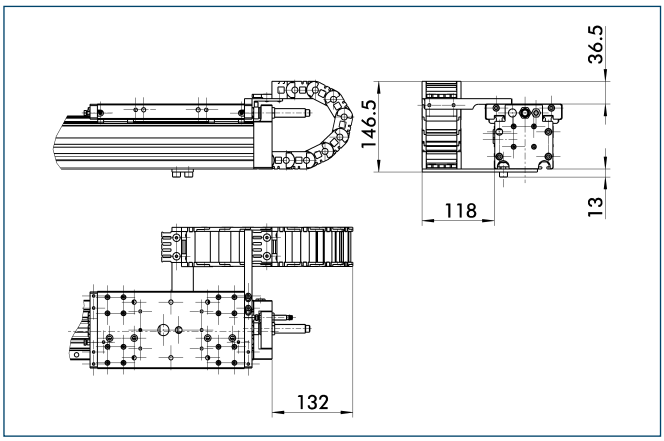


Figure: Attachment variant 1
Other attachment variants are possible as standard. Please contact us for assistance.

Cable track KSV, vertical slide

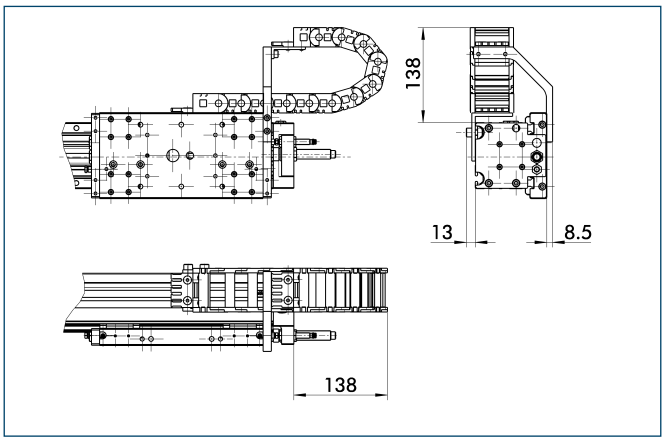
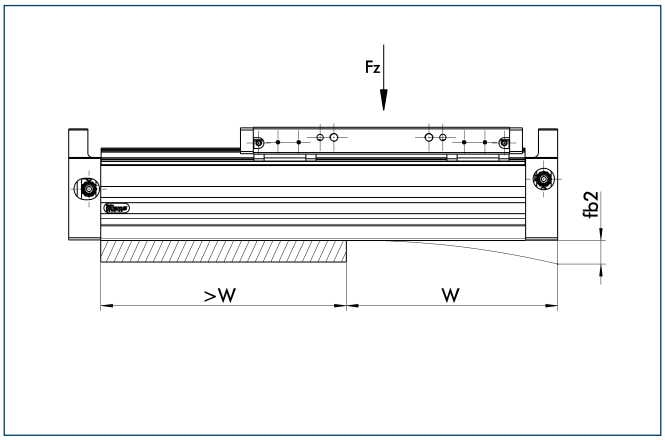
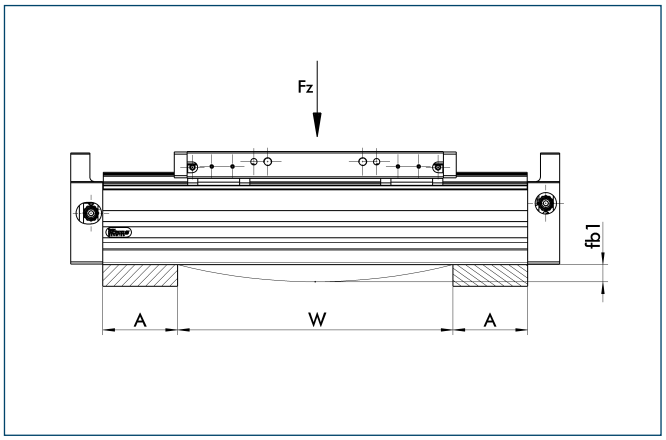


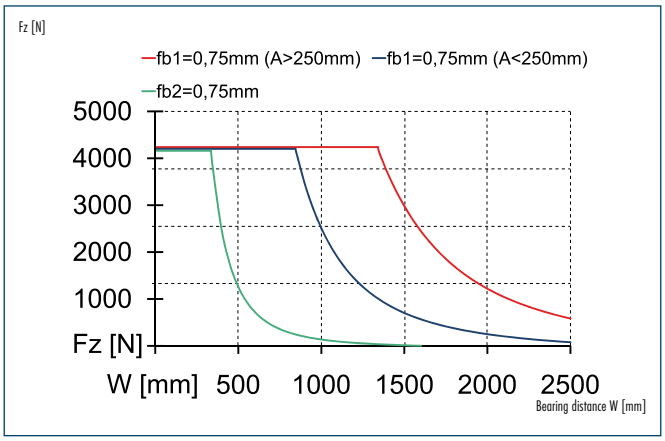
Figure: Attachment variant 1
Other attachment variants are possible as standard. Please contact us for assistance.

You can find further information and components for the accessories mentioned here in the "Accessories" part of the catalog.

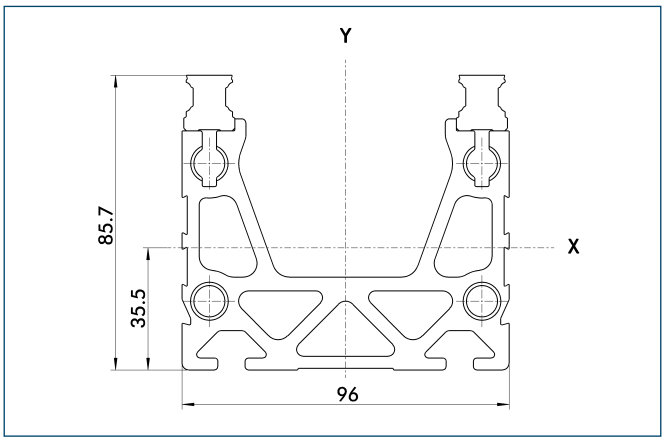
Deflection







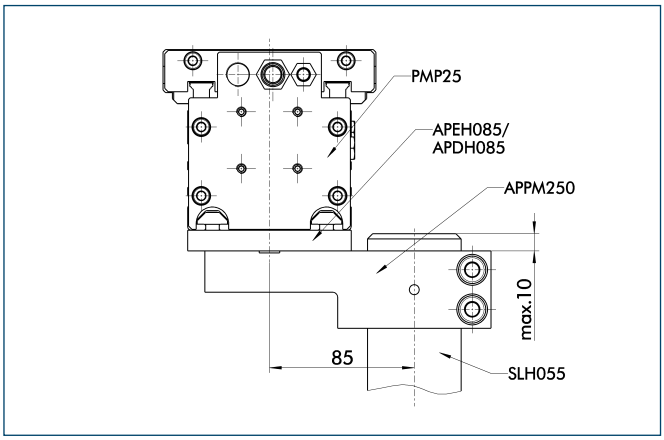
Section data



Designation		
Profile surface A	[mm²]	2698.4
Mass/1000 mm	[kg]	9.9
Planar moment of inertia I_x	[cm⁴]	177.4
Planar moment of inertia I_y	[cm⁴]	313.2
Load torque I_x	[cm³]	35.3
Load torque I_y	[cm³]	65.3

You can find further information and components for the accessories mentioned here in the “Accessories” part of the catalog.

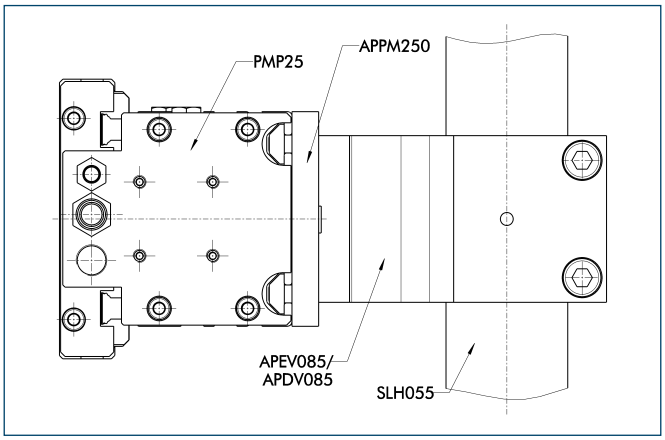
Attachment to the pillar profile modular system,



This view shows the attachment of the portal module to the pillar profile modular system. You can find more information and components in the “Assembly systems” chapter.

Designation	ID	Scope of delivery
APPM 250	**0313398**	4 x NT-M8, 4 x M8 x 14 DIN912

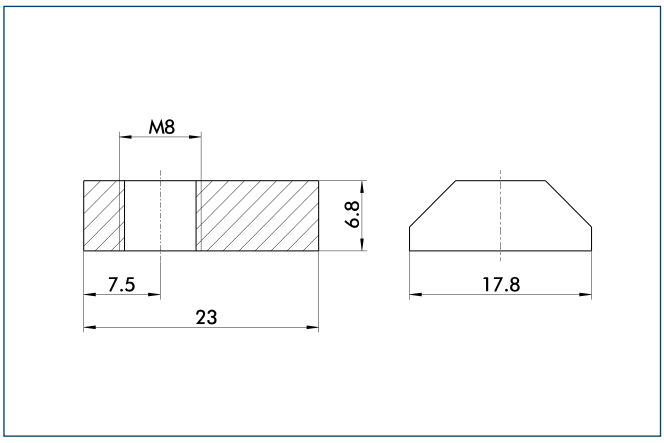
Attachment to the pillar profile modular system,



This view shows the attachment of the portal module to the pillar profile modular system.
You can find more information and components in the “Assembly systems” chapter.

Designation	ID	Scope of delivery
APPM 250	**0313398**	4 x NT-M8, 4 x M8 x 14 DIN912

Mounting



Designation	ID
NT-M8	**0313608**

You can find further information and components for the accessories mentioned here in the “Accessories” part of the catalog.

Sample order

PMP - S - 25 - 0600 - 0 - 0 - 00 - 000

Number of intermediate stops

Attachment, stop slide
1 = on the air-connection side (only size 25)
2 = opposite the air connection
3 = on both sides (only size 25)

Intermediate position
0 = without intermediate position
1 = with AS 25-1 stop slide
2 = with AS 25-2 stop slide

Attachment variant, cable track
1 = variant 1

Cable track
0 = without cable track
1 = KSV, vertical slide
2 = KSH, horizontal slide

Number of proximity switches

Shock absorber
0 = without shock absorber
1 = with 1 shock absorber per end position
2 = with 2 shock absorbers per end position (only size 25)

Useful stroke

Size
16
25

Bellow
S = without
F = with

ⓘ Not all combinations of options are possible. Please speak to us in order to find the right combination for your application.

PORTAL ACTUATOR

TYPES

PMP 16,

PMP 25

Dear Customer,

Congratulations on choosing a SCHUNK product. By choosing SCHUNK, you have opted for the highest precision, top quality and best service.

You are going to increase the process reliability of your production and achieve best machining results – to the customer's complete satisfaction.

SCHUNK products are inspiring.
Our detailed assembly and operation manual will support you.

Do you have further questions? You may contact us at any time – even after purchase. You can reach us directly at the mentioned addresses in the last chapter of these instructions.

Kindest Regards,

Your SCHUNK GmbH & Co. KG
Precision Workholding Systems
Bahnhofstr. 106 - 134
D-74348 Lauffen/ Neckar

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1 Safety

1.1 Symbol Key

You will find this symbol wherever **hazards for persons** or **damage to the product** are possible.

This symbol indicates **important information** on the product or its handling.

1.2 Appropriate Use

The unit must only be used within the scope of its technical data. Appropriate use also includes compliance with the conditions the manufacturer has specified for commissioning, assembly, operation, environment and maintenance. Using the unit with disregard to even a minor specification will be deemed inappropriate use. The manufacturer assumes no liability for any injury or damage resulting from inappropriate use.

The Portal actuators are manufactured in accordance with the current level of technology and with recognised safety regulations. During their use, however, there may occur risks to life and limb of the user or impairment of the portal actuator and other material assets.

The Portal actuators are intended exclusively for the Portal movement of service loads in any position that do not react in their manipulation with any risk to persons, property or the environment.

The maximum permissible service loads and forces are given in our standard catalogue.
Any usage beyond these definitions is inappropriate.
The manufacturer cannot be held liable for loss or damage arising therefrom. The risk is borne exclusively by the user.

The Portal actuator must only be operated by persons that are familiar therewith and that have been instructed in the associated hazards. The relevant accident prevention regulations and the other generally recognised safety and occupational health regulations must be complied with.

1.3 Safety Notes

1. Responsibility for the compatibility of pneumatic equipment lies with the person who designs the pneumatic system or takes the decision on its specifications.

- Since the products specified herein can be used under various operating conditions, their compatibility with the appropriate pneumatic system must be based on specifications and/or tests in order to conform to their requirements.

2. Machines and equipment operated by pneumatic means may only be used by trained personnel.

- Compressed air can be hazardous if an operator is not familiar with its use. The assembly, handling or repair of pneumatic systems is to be undertaken by trained and experienced personnel.

3. Do not carry out maintenance work on machines and equipment and do not attempt to remove components until it has been confirmed that it is safe to do so.

- Inspection and maintenance of machines and equipment may only be carried out after it has been confirmed that the devices that must be switched off are in a securely deactivated condition.

- If machine parts must be removed, carry out safety precautions as mentioned above. Deactivate the compressed air supply to this machine and release any remaining compressed air from the system.
- Before machines and equipment are switched on again, take measures to ensure that cylinder rods etc. are not pushed outwards. Allow compressed air to enter the system slowly so that counterpressure builds up gradually.

4. Contact SCHUNK (see chapter 12 page 16) if the product is to be used under one of the following conditions:

- Conditions and environments that lie outside the stated specifications, or where the product is to be used outdoors.
- Installation in equipment in conjunction with nuclear power, railways, aerospace, vehicles, medical equipment, food and drink, leisure equipment, emergency shutdown circuits, applications in presses or safety equipment.
- Any application that may possibly have negative influences on persons, animals or property and that requires a special safety analysis.

5. This user manual should always be easily accessible.

1.4 Indications to the operating manual

This user manual describes Portal actuators of series PMP 16 and PMP 25.
All statements in this user manual refer to the types stated above.

2 Warranty

The warranty period is 24 months or 40 million load cycles after delivery date from the factory, assuming use in single-shift operation and that the recommended maintenance and lubrication intervals are respected. Components that come into contact with workpieces, wearing parts, shock absorbers, stop screws and proximity switches are never included in the warranty.
The warranty covers the replacement or repair of defective parts in the manufacturing plant. Further claims are hereby excluded. In this context, please also see our General Terms and Conditions.

3 Scope of Delivery

The scope of delivery comprises

- Portal actuator PMP, depending on the version ordered

4 Technical Data

Please consult our catalogue for further technical details. The last version is valid in each case. (in accordance with Chapter 2.3 General Terms and Conditions)

The airborne sound emitted from the unit is <= 70dB(A)

5 Operating and environmental conditions

- Do not use the product in environments comprising corrosive gases, salt water, water or vapours.
- For use in an atmosphere where water drops, oil, sprays etc, occur take appropriate countermeasures in order to ensure protection.
- If electronic end switches are to be used, these should not be used in the presence of strong magnetic fields.
  Please contact SCHUNK (see chapter 12 page 16) if the product is to be used in the presence of strong magnetic fields.
- Do not use the portal actuator in an atmosphere in which it could come into contact with fluids such as oil or water.
- Do not use the portal actuator in an atmosphere in which it could come into direct contact with substances such as powder dust, dust, sprays etc.
- Do not use the portal actuator in an atmosphere in which sources of heat are present.
- Do not subject the portal actuator to excessive vibrations and/or shocks.

6 Assembly and Installation

6.1 Design precautions

- A protective guard is recommended in order to minimise the risk of injury.
- Ensure that loose, fixed and/or connected parts or tightened securely.
- Due to the high levels of kinetic energy, shock absorbers must be used.
- Take account of the possibility that the operating pressure may decrease as a result of power failures etc.
- Pay attention to the possibility of the failure of power supplies.
- Mount the compressed air supply in such a way as to prevent sudden extension of the system.
- Pay attention to emergency shutdown facilities.
- Pay attention to what will happen after an emergency stop or abnormal stoppage. Ensure that nobody can be placed at risk or be injured when equipment is restarted.

6.2 Compressed air supply

- Use clean compressed air and insert a filter between the supply and the pneumatic system.
- Install a water separator in the pneumatic system.
- Use the product only within the range specified for the medium temperature and ambient temperature.

Air specification

- dry (free from condensation)
- filtered to 10 microns
- oiled or oil-free

6.3 Special connecting measures

- Use connecting pipes of a cross-section that is larger than or identical to that of the connector thread.
- Blow air through the connecting pipes before fitting the devices in order to remove any dust, contaminant or particles.
- Avoid the ingress of sealing material into the pipe network.
- Do not remove pneumatic components from their packaging until shortly before fitting.

6.4 Assembly measures

- During the mounting of loads, do not allow the system to be subjected to impermissible forces or moments.
- The flatness of the mounting surfaces must be less than 0.02mm.
- Select the correct means of connection with a load that has its own guidance mechanism and ensure that this is adequately aligned.
- Avoid contact with the Portal actuator during operation.
- Select a suitable screw tightening torque for mounting of the Portal actuator or loads on the Portal actuator in accordance with the generally valid guidelines for screw connections.

6.5 Measures for the initial operation

Please read this user manual carefully. Knowledge of this user manual is essential in order to prevent errors and ensure problem-free operation.

Under no circumstances may Portal actuators be operated with oiled air if they are subsequently to be operated with oil-free air.

- Check the technical specifications.
- Do not use the device until you have checked that it functions correctly taking account of all permissible operating parameters.
- Use only a 5/3-way valve for operation that fills both chambers of the drive cylinder with air in the central position. In this way, you will ensure that both cylinder chambers are filled uniformly with air each time the installation is activated and prevent any rapid expulsion of the table.
- Regulate the operating speed of the cylinder by means of throttle type non-return valves. Increase from the low speed to higher speeds until the required operating speed is reached.

Selection and dimensioning

- Do not subject the units to loads that exceed the limits of their operating range. If excessive loads are applied, the guidance unit could suffer damage or inaccuracies. The maximum permissible loads are given in our standard catalogue.
- Do not allow the system to experience impermissible forces or shocks.

7 Handling

7.1 End position sets

The following components are available for limiting of stroke length, damping and detection of end positions:

- VE (Variable end stop)
- LMST-... (shock absorber stop)
- NI 30 (Proximity switch)

The drawing (see Figure 1) below shows the mounting of LMST-... and NI 30 in the portal actuator with and without a variable end stop VE

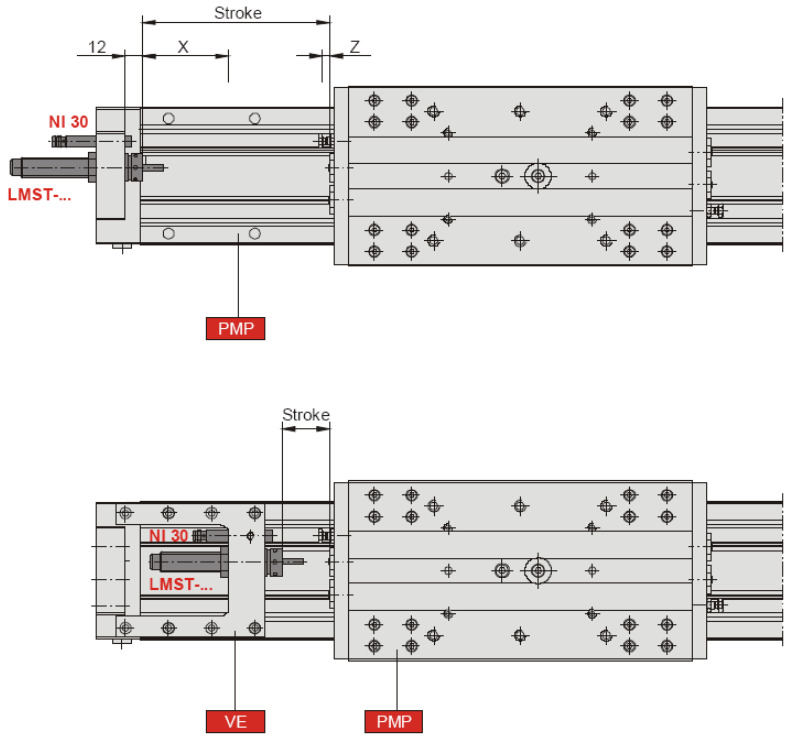

Figure 1: portal actuator with and without a variable end stop VE

7.1.1 End position „X“

The end positions can be precisely adjusted by means of the shock absorber stops LMST-... .
The maximum possible adjustment range for X can be found in our standard catalogue.

7.1.2 Stroke length

The variable end stops VE can be used to adjust the stroke and its position over the whole stroke length of the portal actuator. For fitting, the closing plugs and fixing screws of the monorail guidance systems must be removed in the selected area.

Important!
Please ensure that the T-nuts remaining in the slots do not move.

After the variable end stop has been located with the centring sleeves supplied, it must be screw mounted together with the monorail guidance systems.

Further information is given in our standard catalogue.

7.1.3 Damping adjustment mechanism „Z“

The adjustment screw of the damper adjustment mechanism can be used to adjust the stroke of the shock absorber and thereby the damping curve to the kinetic energy occurring. The counternut is loosened and the appropriate setting value is adjusted by turning the adjustment screw.

The permissible setting values Z are given in our standard catalogue.

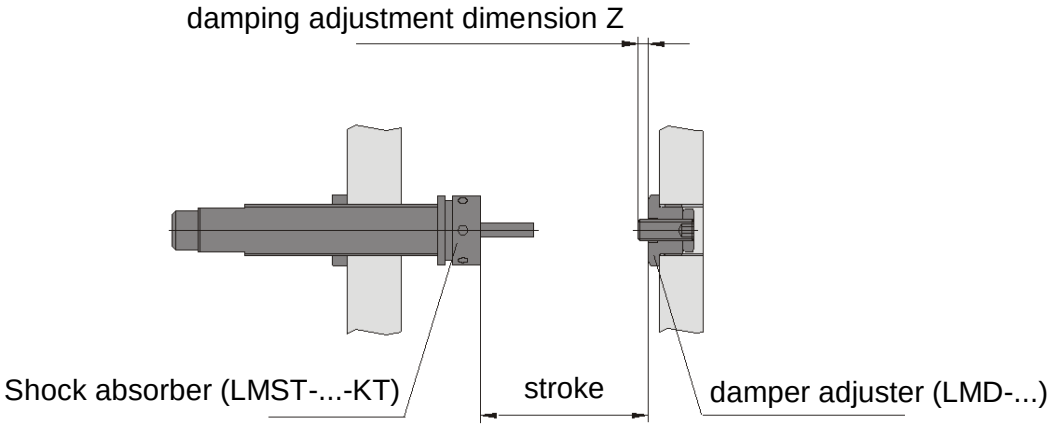

Figure 2: damping adjustment mechanism "Z"

7.2 Intermediate stops AS/ZA

Intermediate stops are additional modules for portal actuators and are available for all types.

Installation drawing

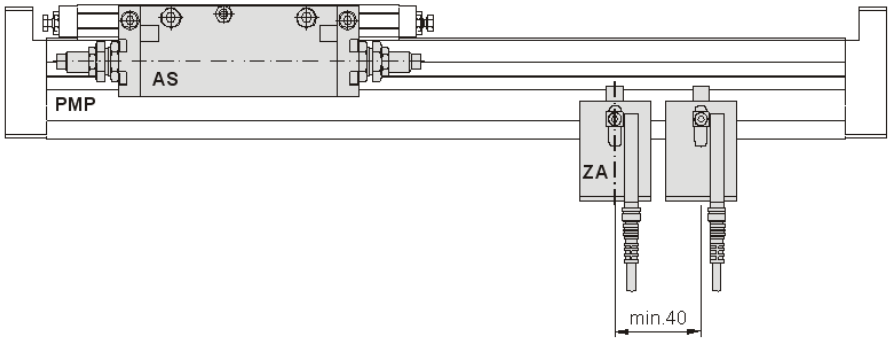

Figure 3: Installation of AS and ZA

The stop slide AS-... is mounted on the carriage of the portal actuator and, depending on the design, is suitable for approaching the intermediate position from one side or both sides.
The stop collar (Pos.5) can be used for precision adjustment of the intermediate position within a ±3mm range. With an appropriate version and setting, the intermediate position can be approached from both sides without a loss of position.
Independently of this, it is also possible to match the end position damping to the specific mass by adjusting the shock absorber (Pos.11).
The cover plate (Pos. 6 and 7) is prepared for installation of a proximity switch NI 30 that interrogates the precision position of the stop slide and thereby that of the intermediate position.

Continued travel from the intermediate position is possible with appropriate control of the gantry actuator by means of a 5/3-way valve (central position = both chambers ventilated) without a repeat stroke.

In accordance with the section drawing above, all parts can be ordered individually.
Ordering numbers are as indicated in the following example

- Part No. 1 AS 25-01

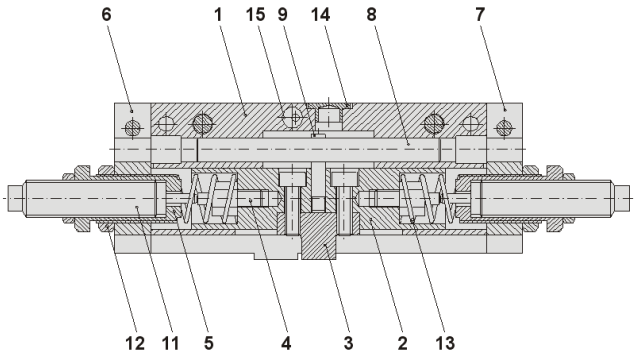

Figure 4: Section drawing PMP

The intermediate stop ZA-... is located by means of the slots in the support rail and can be moved steplessly. It is thereby possible to approach several intermediate positions over the whole stroke length of the portal actuator.

Where there are several intermediate positions, the position at which the portal actuator is actually located is determined by the installation of a proximity switch NI 30. In conjunction with the proximity switches in the stop slide AS-…, each position can thus be interrogated precisely.

In accordance with the section drawing (see Figure 5), all parts can be ordered individually.
Ordering numbers are as indicated in the following example

- Part No. 2 ZA 25-02

As standardised wear part sets, seal sets are available under the following ordering numbers:

- ZADI 16 for intermediate stop ZA 16
- ZADI 25 for intermediate stop ZA 25

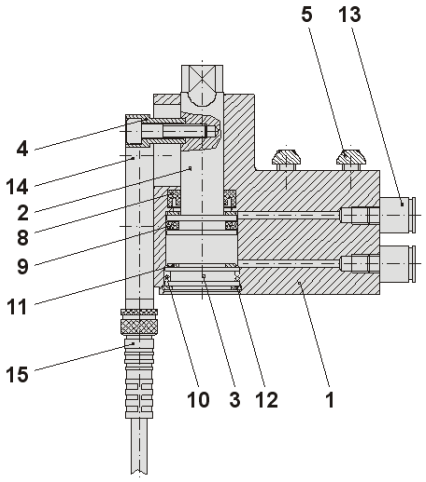

Figure 5: Installation of a proximity switch NI 30

8 Repairs

The repair or elimination of defects on our products by the customer may only be carried out with our explicit written agreement. Any failure to adhere to this principle renders invalid our warranty and liability for any resulting warranty or secondary losses.

Following receipt and examination, all portal actuators of series PMP can be repaired by SCHUNK.

9 Response to malfunctions

Malfunctions that are caused by defective components may only be remedied by replacement of these components.

Defective components may only be replaced by SCHUNK genuine replacement parts.

Malfunction	Cause	Remedy
Actuator does not move in/out	(1) No compressed air (2) Incorrect pneumatic connections (3) Mechanical damage	(1) Check compressed air (2) Check pneumatic elements (3) Check mechanical parts
End position signal not present	(1) Initiator incorrectly set in relation to stop (2) Initiator defective (3) Broken cable	(1) Readjust initiator (2) Replace initiator (3) Replace initiator cable
Actuator impacts on end positions	(1) Damping incorrectly adjusted (2) Shock absorber defective (3) Ventilation valve defective (4) Stroke speed too high	(1) Adjust stop screw (2) Change shock absorber (3) Check ventilation valve (4) Set ventilation valve
Service load vibrates in end position	(1) Stroke speed too high (2) Inadequate damping (3) Unfavourable installation (4) Unfavourable PMP type	(1) Set ventilation valve (2) Optimise damper stroke (3) Check design (4) Use larger PMP type

10 Maintenance and Care

Under no circumstances may Portal actuators be operated with oiled air if they are subsequently to be operated with oil-free air.

- The integral drive cylinder is lubricated for life and does not require relubrication. Operation with oiled or oil-free compressed air is permissible without restrictions.
- Under normal operating conditions, clean the entire portal actuator every 3 months or after a distance of 500km using a soft, oil-soaked cloth and remove all encrusted dust and grease residues.
  Carry out a precise optical inspection of the portal actuator in order to identify any unusual wear in good time.
- Lubrication the carriages of the monorail guidance system via the lubrication points (lubrication nipples) provided for this purpose. Two carriages should always be connected to one lubrication point. Press grease into the lubrication nipples until it emerges at the seal lips of the carriages. Afterwards, move the carriage once forwards and backwards over the entire stroke length and wipe away the grease remaining on the guideways using a soft oil cloth.
- Use a lithium soap multi-purpose grease to DIN designation KP2-K in accordance with DIN 51502 or 51825
  Lubricants with solid lubricant additives such as MoS_2, graphite and PTFE are not suitable.

11 Replacement parts

11.1 PMP 16

As a standardised wear part set, a seal set is available under ordering number PMDI 16. The scope of delivery includes all seals as well as the sealing and covering strip for the drive cylinder.

In accordance with the section drawing below, all other wear parts and individual parts are available as single items.

Ordering numbers are as indicated in the following example

- Part No. 4 PMP16-04

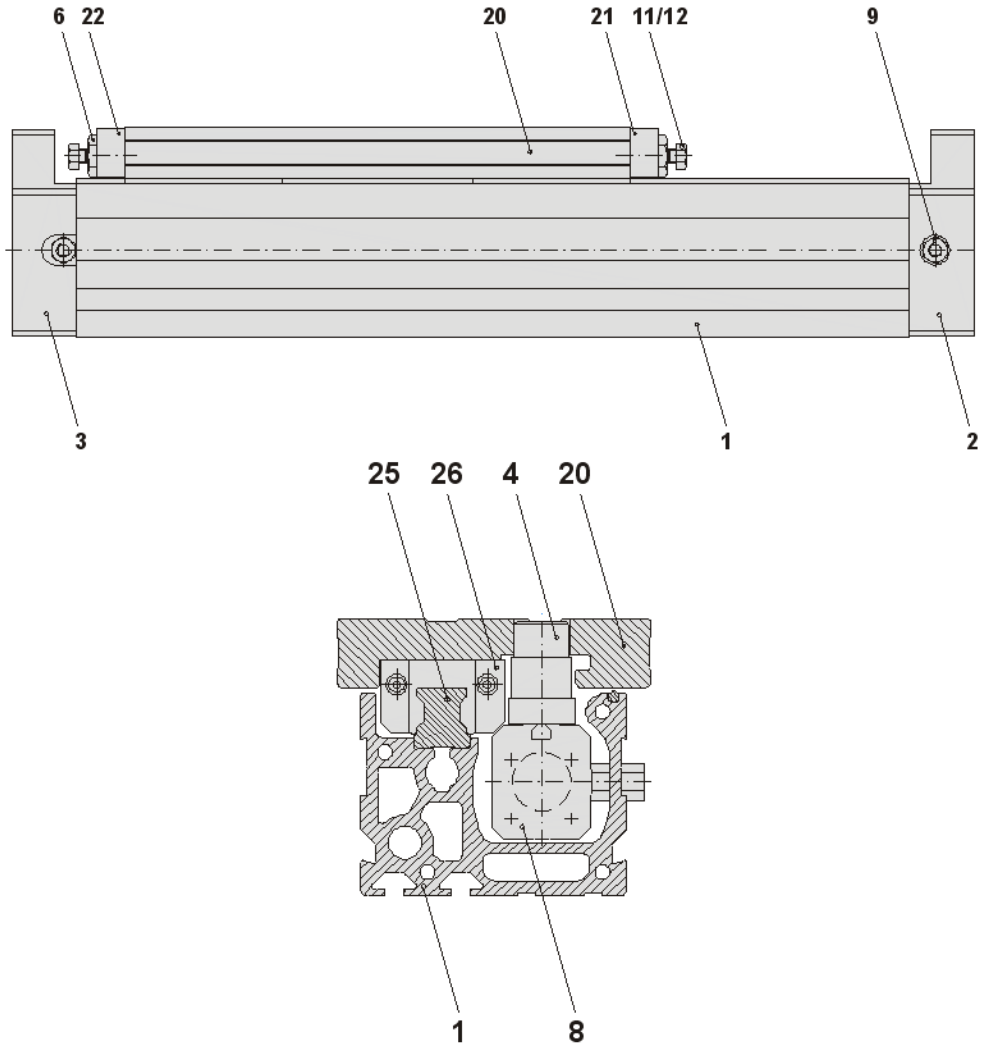

Figure 6: section drawing PMP 16

11.2 PMP 25

As a standardised wear part set, a seal set is available under ordering number PMDI 25. The scope of delivery includes all seals as well as the sealing and covering strip for the drive cylinder.

In accordance with the section drawing below, all other wear parts and individual parts are available as single items.

Ordering numbers are as indicated in the following example

- Part No. 1 PMP 25-01

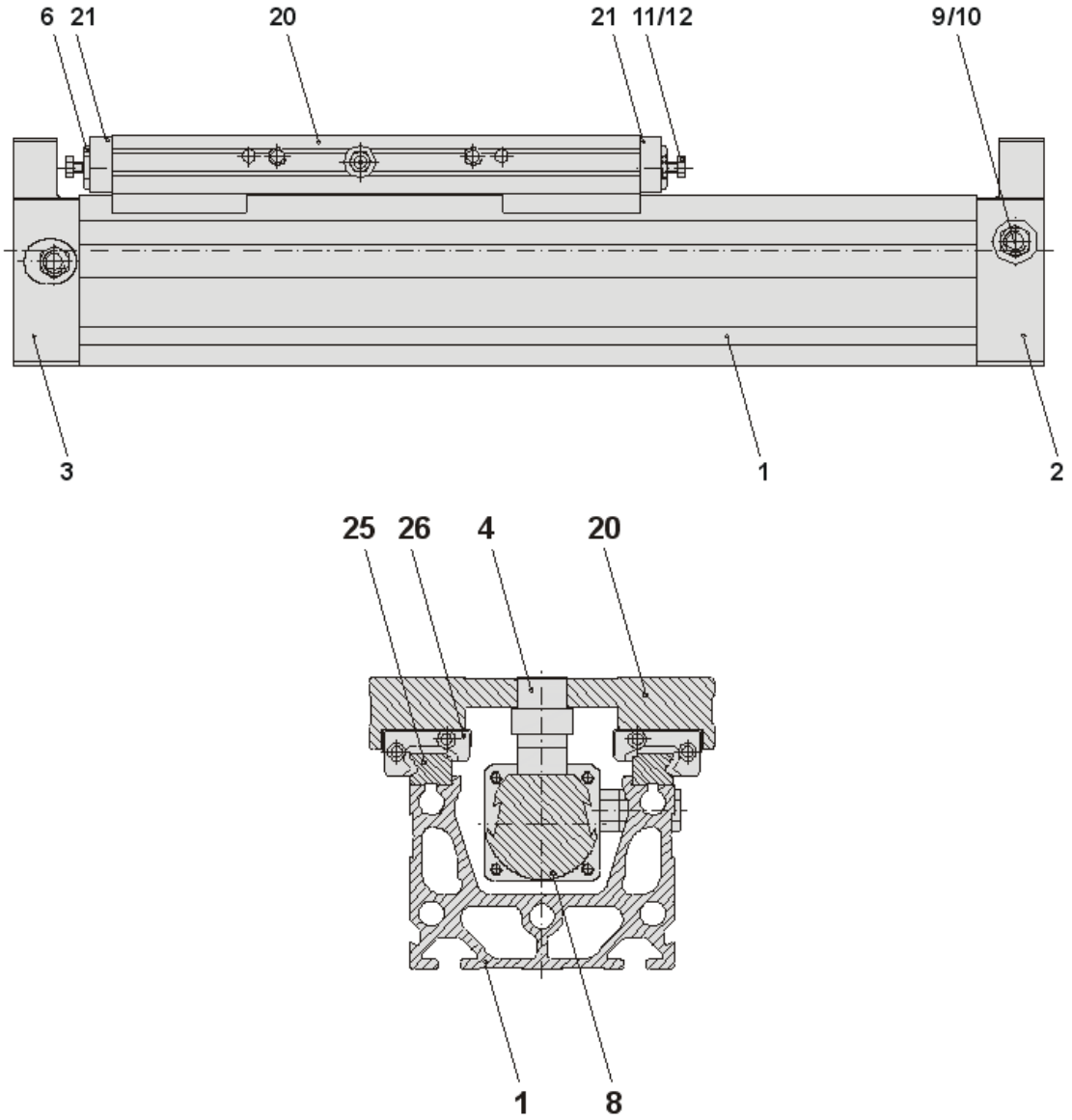

Figure 7: section drawing PMP 25

12 EC declaration of incorporation

In terms of the EC Machinery Directive 2006/42/EC, annex II B

Manufacturer/ distributor	SCHUNK GmbH & Co. KG. Spann- und Greiftechnik Bahnhofstr. 106 – 134 74348 Lauffen/Neckar, Germany

We hereby declare that the following product:

Product designation:	Portal modules pneumatic, Gantry axis
Type designation:	PMP 16…PMP 25
ID number:	0314110…0314151

meets the applicable basic requirements of the Directive **Machinery (2006/42/EC)**.

The incomplete machine may not be put into operation until conformity of the machine into which the incomplete machine is to be installed with the provisions of the Machinery Directive (2006/42/EC) is confirmed.

Applied harmonized standards, especially:

EN ISO 12100-1	Safety of machines - Basic concepts, general principles for design -- Part 1: Basic terminology, methodology
EN ISO 12100-2	Safety of machines - Basic concepts, general principles for design -- Part 2: Technical principles

The manufacturer agrees to forward on demand the special technical documents for the incomplete machine to state offices.

The special technical documents according to Annex VII, Part B, belonging to the incomplete machine have been created.

Person responsible for documentation: Mr. Michael Eckert, Tel.: +49(0)7133/103-2204

Location, date/signature:

Lauffen, Germany,
January 2011

p.p.

Title of the signatory: Director for Development

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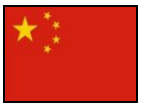

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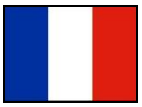

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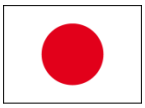

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Appendix 2

Linear actuator LM

Stroke module

Pneumatically driven with pre-loaded crossed roller bearings.

Area of application

For use in clean environments, such as assembly and testing systems. Optimal standard solution for high-precision applications.

Advantages – your benefits

Closed slide construction
For high rigidity

Integrated shock absorbers and proximity switches.
For vibration-free movements and end-position monitoring

Compact dimensions
For minimum interfering contours of the entire system

Pre-loaded crossed roller guides
That means absolutely no backlash

High basic load ratings
In all load directions

Several intermediate positions possible
For maximum flexibility in applications

Standardized mounting bores
For numerous combinations with other GEMOTEC system elements

Level control by means of rod lock
For safety in case of emergency stops

General information about the series

Guidance
Pre-loaded crossed roller bearings

Material
Aluminum, hard-anodized

Actuation
Pneumatic, via filtered compressed air (10 µm): dry, lubricated, or non-lubricated
Pressurizing medium: requirements for compressed air quality class according to DIN ISO 8573-1:
Quality class 4

Ambient temperature range
From 5°C to 60°C

Operating pressure range
2 bar to 8 bar

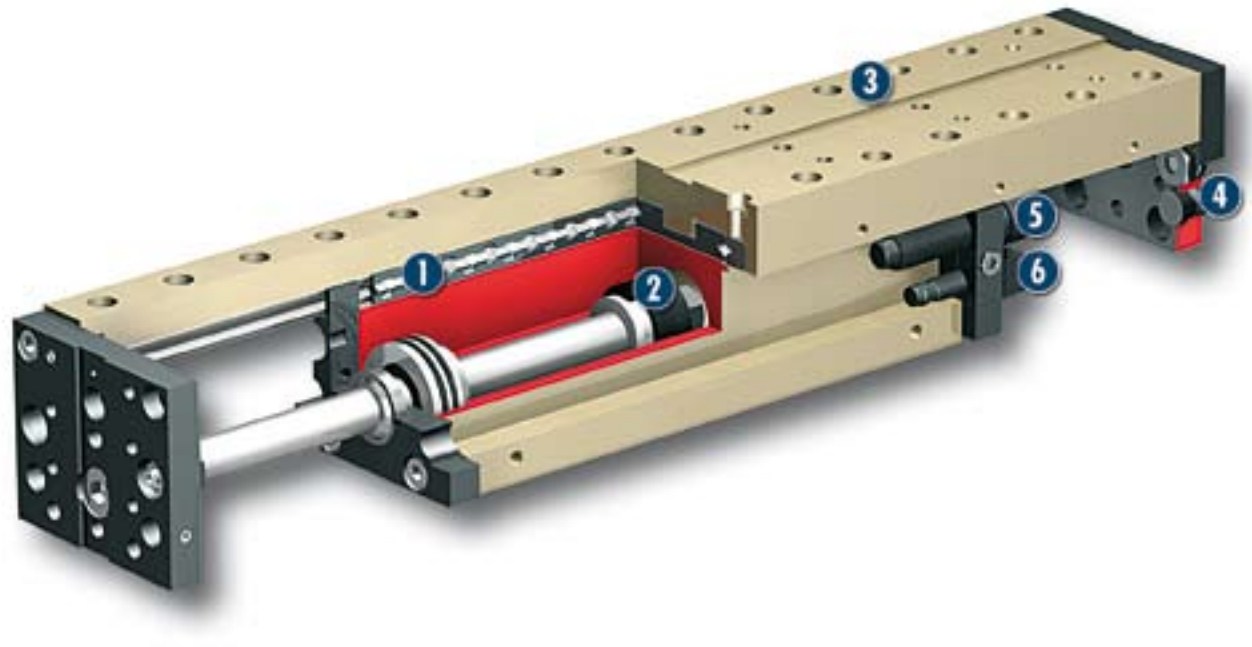
Scope of delivery
Including shock absorbers and driver for proximity switch

Warranty
24 months

Rod lock
Can be retrofitted by using a kit

For production reasons, the colors may vary from those shown in the catalog.

Cross-section of function



1 **Crossed roller guide**
With wiper, pre-loaded, and without backlash

2 **Drive**
Powerful piston rod cylinder

3 **Modular design hole pattern**
Completely integrated in the module system

4 **Dampening adjustment**
Adjustment of the dampening characteristic

5 **End position setting**
Convenient adjustment using the shock absorber threads

6 **Sensor systems**
With sensor driver for convenient adjustment

Description of function

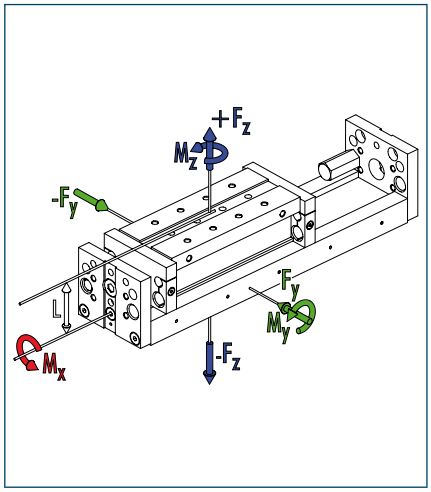
The slide is guided with pre-loaded crossed rollers at the base body and driven with a double-acting pneumatic cylinder which is integrated in the base body.

Options and special information

Fall protection version
Prevents the structure from falling in the event of a sudden loss of energy.

This module can be combined as standard with many elements from the modular system. You can find more information in the “Accessories” chapter.

Moment load



L = 44 mm

ⓘ The forces and moments shown here are maximum values for individual loading. If more than one force or moment occurs simultaneously, the application can be calculated by the TOOLBOX sizing software.

Designation	F_z	M_x	M_y	M_z
	[N]	[Nm]	[Nm]	[Nm]
LM 100-H25	1.570	34.8	29.8	14.9
LM 100-H50	1.352	47.1	43	21.5
LM 100-H75	1.352	47.1	43	21.5
LM 100-H100	1.264	58.8	56.3	28.15
LM 100-H125	1.264	58.8	56.3	28.15
LM 100-H150	1.216	69.9	69.5	34.75
LM 100-H175	1.216	69.9	69.5	34.75
LM 100-H200	1.187	80.5	82.8	41.4
LM 100-H225	1.187	80.5	82.8	41.4

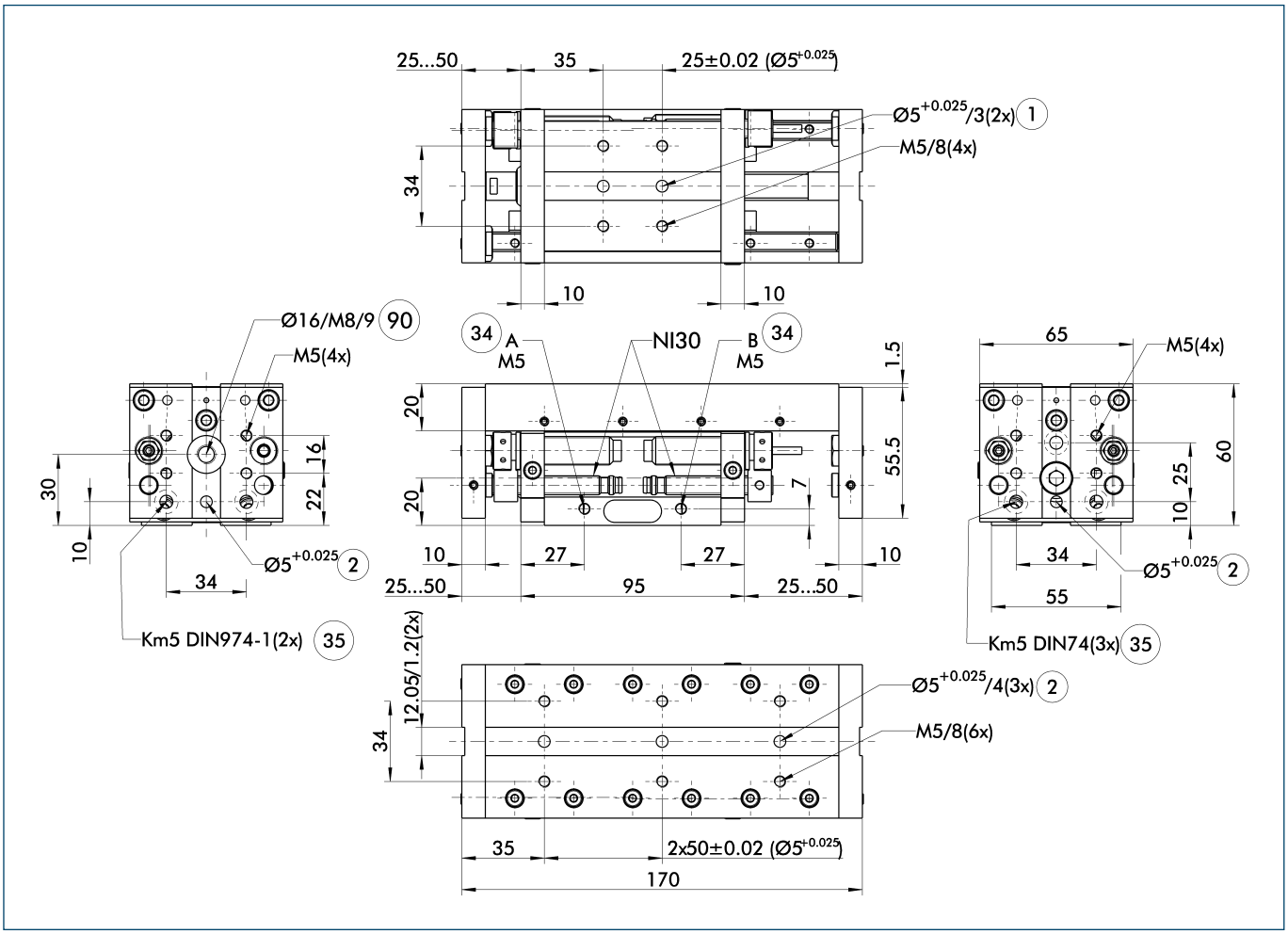
ⓘ Force F_y must be calculated by the TOOLBOX sizing software.

Technical data

Designation		LM 100-H025	LM 100-H050	LM 100-H075	LM 100-H100
	ID	0314061	0314062	0314063	0314064
Stroke length	[mm]	25	50	75	100
Extend force [FV] at 6 bar	[N]	294	294	294	294
Retract force [FR] at 6 bar	[N]	226	226	226	226
Piston diameter	[mm]	25	25	25	25
Rod diameter	[mm]	12	12	12	12
Overall length	[mm]	170	270	270	370
Mass	[kg]	1.9	2.6	2.6	3.3
Fluid consumption/10 mm stroke	[cm³]	4.9	4.9	4.9	4.9
Minimum pressure	[bar]	3	3	3	3
Maximum pressure	[bar]	8	8	8	8
Nominal operating pressure	[bar]	6	6	6	6
IP rating		40	40	40	40
Min. ambient temperature	[°C]	5	5	5	5
Max. ambient temperature	[°C]	60	60	60	60
Repeat accuracy	[mm]	± 0.01	± 0.01	± 0.01	± 0.01
Horizontal travel time at 5 kg additional load	[s]	0.11	0.15	0.18	0.21
Vertical travel time at 5 kg additional load	[s]	0.11	0.15	0.18	0.21
OPTIONS and their characteristics					
Fall protection version	**ID**	**0314461**	**0314462**	**0314463**	**0314464**
Designation		**LM 100-H025-ASP**	**LM 100-H050-ASP**	**LM 100-H075-ASP**	**LM 100-H100-ASP**
Stroke loss of nominal stroke (on the rod side)	[mm]	12	12	12	12
Mass	[kg]	1.98	2.68	2.68	3.38
Static holding force	[N]	600	600	600	600
Max. axial backlash of the clamping	[mm]	0.25	0.25	0.25	0.25
ZZA intermediate stop on the rod side possible		Yes	Yes	Yes	Yes
ZZA intermediate stop on the piston side possible		Yes	Yes	Yes	Yes
LMZAW intermediate stop possible		Yes	Yes	Yes	Yes

LM 100-H125	LM 100-H150	LM 100-H175	LM 100-H200	LM 100-H225
0314065	0314066	0314067	0314068	0314069
125	150	175	200	225
294	294	294	294	294
226	226	226	226	226
25	25	25	25	25
12	12	12	12	12
370	470	470	570	570
3.3	4.0	4.0	4.7	4.7
4.9	4.9	4.9	4.9	4.9
3	3	3	3	3
8	8	8	8	8
6	6	6	6	6
40	40	40	40	40
5	5	5	5	5
60	60	60	60	60
± 0.01	± 0.01	± 0.01	± 0.01	± 0.01
0.24	0.27	0.3	0.33	0.35
0.24	0.27	0.3	0.33	0.35
0314465	0314466	0314467	0314468	0314469
LM 100-H125-ASP	LM 100-H150-ASP	LM 100-H175-ASP	LM 100-H200-ASP	LM 100-H225-ASP
12	12	12	12	12
3.38	4.08	4.08	4.78	4.78
600	600	600	600	600
0.25	0.25	0.25	0.25	0.25
Yes	Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes	Yes

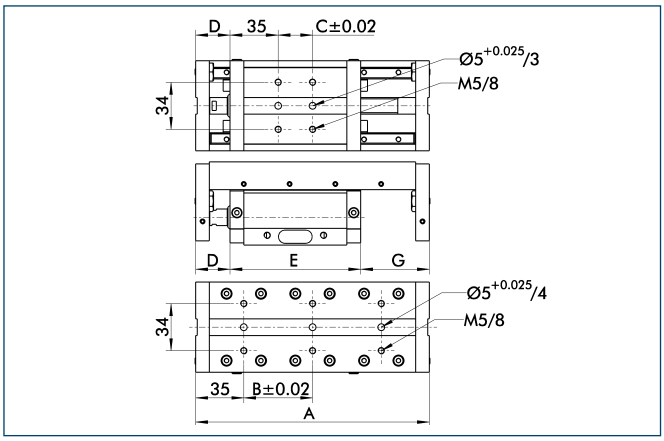
Main views, LM 100-H025



A, a Main and direct connections, extend linear unit
B, b Main and direct connections, retract linear unit
(1) Connection, linear unit
(2) Connection of the assembly
(34) On both attachment faces
(35) Back
(90) Through-bores in the face plate and thread in the base body (only single sided)

The linear module can be fastened either to the base body or the slide. The structure can also optionally be fastened to either the slide or the base body. This view shows the mounting of the module to the base body and the mounting of the structure to the slide.

Stroke variants



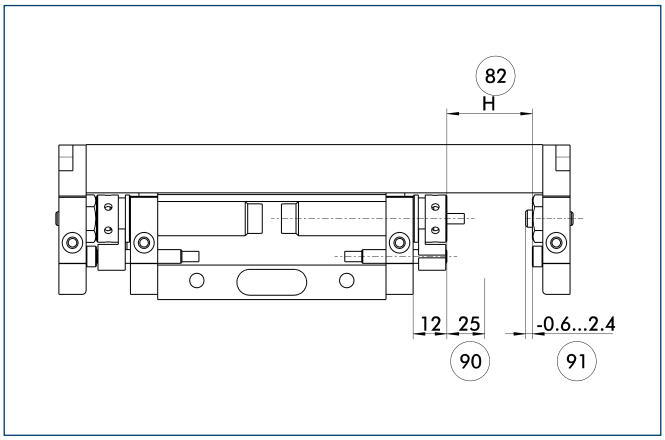
Not all dimensions shown can be seen in the main view.

Variable dimensions of stroke variants

Type	Stroke	A	B	C	D	E	G
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
LM 100-H025	25	170	2x50	1x25	25...50	95	50...25
LM 100-H050	50	270	4x50	3x25	25...75	145	100...50
LM 100-H075	75	270	4x50	3x25	25...100	145	100...25
LM 100-H100	100	370	6x50	5x25	25...125	195	150...50
LM 100-H125	125	370	6x50	5x25	25...150	195	150...25
LM 100-H150	150	470	8x50	7x25	25...175	245	200...50
LM 100-H175	175	470	8x50	7x25	25...200	245	200...25
LM 100-H200	200	570	10x50	9x25	25...225	295	250...50
LM 100-H225	225	570	10x50	9x25	25...250	295	250...25

You can find further information and components for the accessories mentioned here in the “Accessories” part of the catalog.

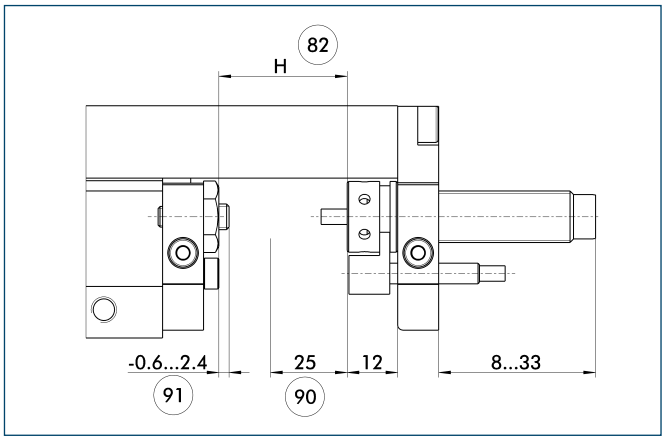
Fine adjustment



82 Stroke
90 Stroke adjustment range
91 Dampening stroke adjustment range

Shock absorbers can be mounted either on the base body or on the slide. This illustration shows the mounting on the base body and the possibility of stroke fine adjustment.

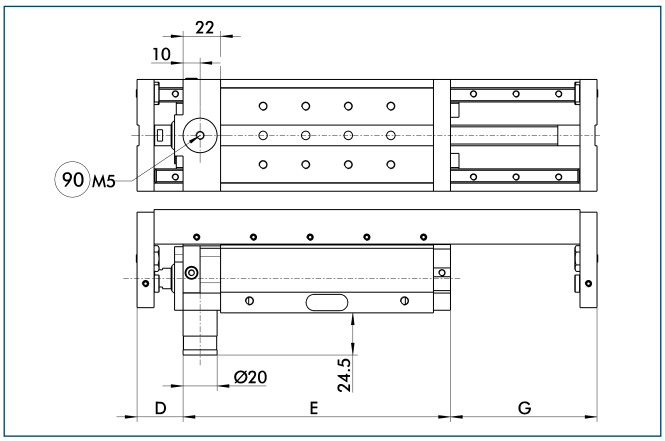
Fine adjustment



82 Stroke
90 Stroke adjustment range
91 Dampening stroke adjustment range

Shock absorbers can be mounted either on the base body or on the slide. This illustration shows the mounting on the slide and the possibility of stroke fine adjustment.

Rod lock



90 Air connection, rod lock

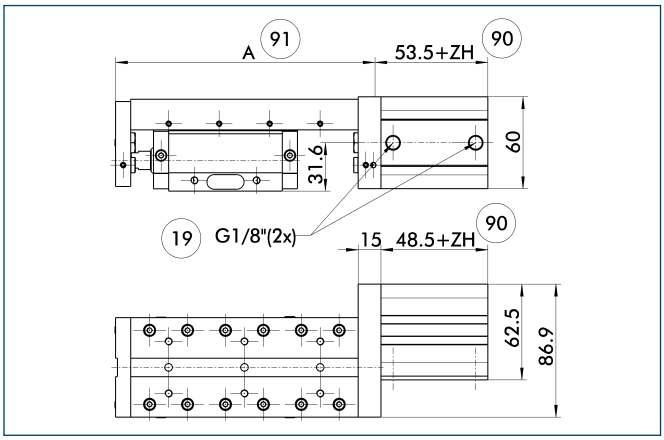
The rod lock prevents weights from falling in the event of energy loss, such as emergency stop situations. The rod lock can also be retrofitted, but this will reduce the useful stroke.

Variable dimensions of rod lock

Type	Stroke	D	E	G
	[mm]	[mm]	[mm]	[mm]
LM 100-H025	13	25...38	107	38...25
LM 100-H050	38	25...63	157	88...50
LM 100-H075	63	25...88	157	88...25
LM 100-H100	88	25...113	207	138...50
LM 100-H125	113	25...138	207	138...25
LM 100-H150	138	25...163	257	188...50
LM 100-H175	163	25...188	257	188...25
LM 100-H200	188	25...213	307	238...50
LM 100-H225	213	25...238	307	238...25

You can find further information and components for the accessories mentioned here in the “Accessories” part of the catalog.

Intermediate stop, ZZA on the piston side



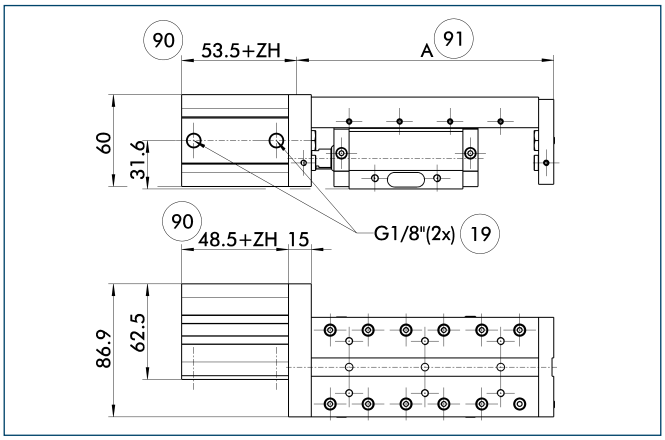
(19) Air connection
(90) Intermediate stroke
(91) Overall length "A", the variant without intermediate stroke (see dimension table of stroke variants)

ZZA 101		
Holding force at 6 bar	[N]	460
Additional mass at 0 mm stroke	[kg]	0.75
Additional mass per mm stroke	[kg]	0.006

Sample order	LM 100-H100-ZZA101-H30

The intermediate position is measured from the respective end position. The intermediate position can be approached from both sides and can proceed in the original stroke direction.. The holding force is the piston force of the intermediate stop less the piston force of the linear module.

Intermediate stop, ZZA on the piston rod side



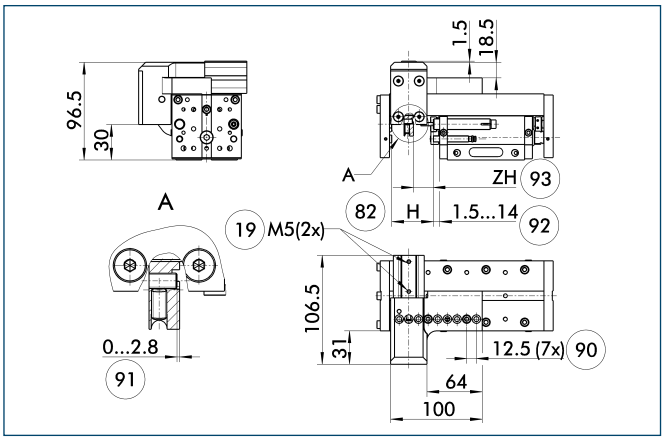
(19) Air connection
(90) Intermediate stroke
(91) Overall length "A", the variant without intermediate stroke (see dimension table of stroke variants)

ZZA 102		
Holding force at 6 bar	[N]	460
Additional mass at 0 mm stroke	[kg]	0.75
Additional mass per mm stroke	[kg]	0.006

Sample order	LM 100-H100-ZZA102-H30

The intermediate position is measured from the respective end position. The intermediate position can be approached from both sides and can proceed in the original stroke direction.. The holding force is the piston force of the intermediate stop less the piston force of the linear module.

Intermediate stop, LMZAW

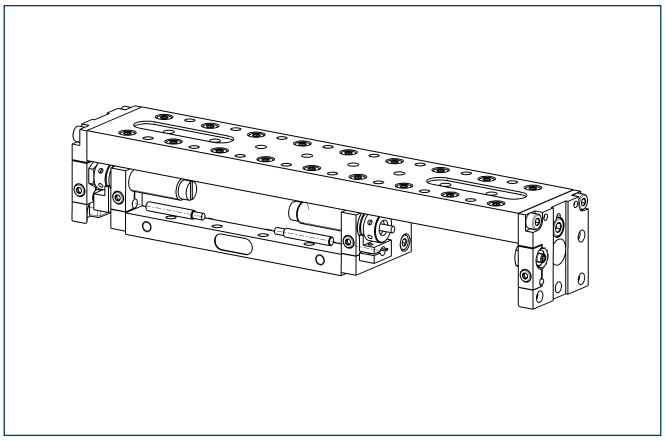


(19) Air connection
(82) Stroke
(90) Grid dimension, stroke adjustment
(91) Dampening stroke adjustment range
(92) Stroke fine adjustment range
(93) Intermediate stroke (min. 12.5 mm / max. useful stroke H-4 mm)

Designation	ID	Mass [kg]
LMZAW 100	**0314115**	0.98

Depending on the application, the end position can be approached without a repeat stroke. The possible operating cycles can be obtained from the operating manual.

Sensor systems



End-position monitoring:
Inductive proximity switch, can be directly mounted

Designation	ID
NI 30-KT	**0313429**

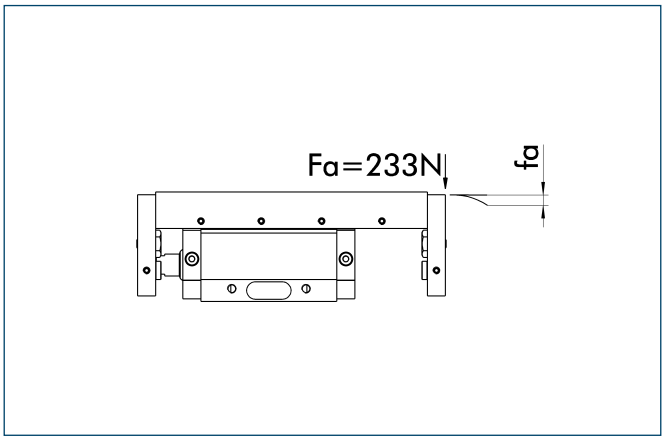
Extension cable for proximity switch

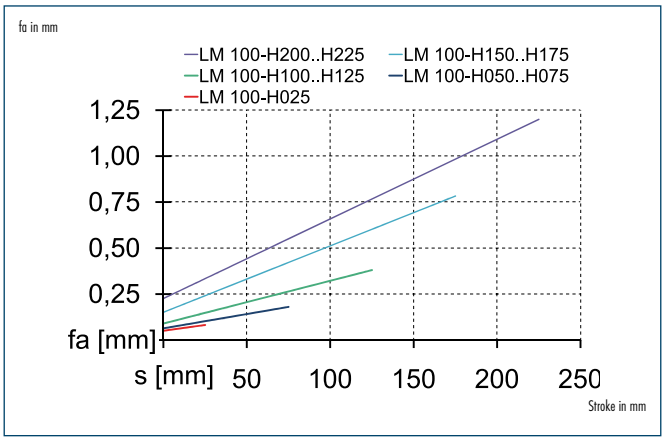
Designation	ID	Remark
STV 10	**0313432**	Sleeve M8x1, straight
STV 20	**0313433**	Sleeve M8x1, angled

ⓘ Generally, two sensors are needed for each linear unit. For additional monitoring of the intermediate positions, one sensor per additional position as well as (optionally) one extension cable will be needed.

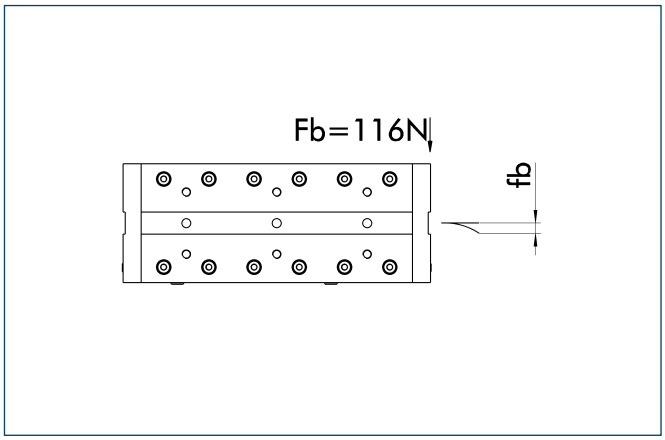
You can find further information and components for the accessories mentioned here in the "Accessories" part of the catalog.

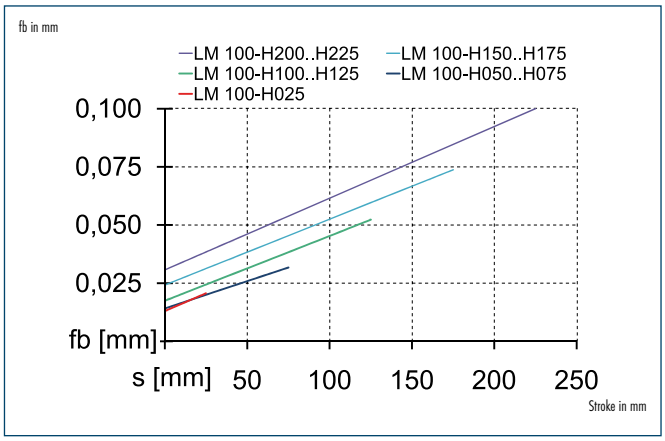
Deflection under load: fa





Deflection under load: fb





You can find further information and components for the accessories mentioned here in the “Accessories” part of the catalog.

LINEAR ACTUATOR

TYPES

LM 25 TO

LM 300

Dear Customer,

Congratulations on choosing a SCHUNK product. By choosing SCHUNK, you have opted for the highest precision, top quality and best service.

You are going to increase the process reliability of your production and achieve best machining results – to the customer's complete satisfaction.

SCHUNK products are inspiring.
Our detailed assembly and operation manual will support you.

Do you have further questions? You may contact us at any time – even after purchase. You can reach us directly at the mentioned addresses in the last chapter of these instructions.

Kindest Regards,

Your SCHUNK GmbH & Co. KG
Precision Workholding Systems
Bahnhofstr. 106 - 134
D-74348 Lauffen/ Neckar

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Reg.-No. DE-3496-01

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1 Safety

1.1 Symbol key

You will find this symbol wherever hazards for persons or damage to the product are possible.

This symbol indicates important information on the product or its handling.

1.2 Appropriate Use

The unit must only be used within the scope of its technical data. Appropriate use also includes compliance with the conditions the manufacturer has specified for commissioning, assembly, operation, environment and maintenance. Using the unit with disregard to even a minor specification will be deemed inappropriate use. The manufacturer assumes no liability for any injury or damage resulting from inappropriate use.

The linear actuators are manufactured in accordance with the current level of technology and with recognised safety regulations. During their use, however, there may occur risks to life and limb of the user or impairment of the portal actuator and other material assets.

The linear actuators are intended exclusively for the linear movement of service loads in any position that do not react in their manipulation with any risk to persons, property or the environment.

The maximum permissible service loads and forces are given in our standard catalogue.
Any usage beyond these definitions is inappropriate.
The manufacturer cannot be held liable for loss or damage arising therefrom. The risk is borne exclusively by the user.

The linear actuator must only be operated by persons that are familiar therewith and that have been instructed in the associated hazards. The relevant accident prevention regulations and the other generally recognised safety and occupational health regulations must be complied with.

1.3 Safety Notes

1. Responsibility for the compatibility of pneumatic equipment lies with the person who designs the pneumatic system or takes the decision on its specifications.

- Since the products specified herein can be used under various operating conditions, their compatibility with the appropriate pneumatic system must be based on specifications and/or tests in order to conform to their requirements.

2. Machines and equipment operated by pneumatic means may only be used by trained personnel.

- Compressed air can be hazardous if an operator is not familiar with its use. The assembly, handling or repair of pneumatic systems is to be undertaken by trained and experienced personnel.

3. Do not carry out maintenance work on machines and equipment and do not attempt to remove components until it has been confirmed that it is safe to do so.

- Inspection and maintenance of machines and equipment may only be carried out after it has been confirmed that the devices that must be switched off are in a securely deactivated condition.
- If machine parts must be removed, carry out safety precautions as mentioned above. Deactivate the compressed air supply to this machine and release any remaining compressed air from the system.
- Before machines and equipment are switched on again, take measures to ensure that cylinder rods etc. are not pushed outwards. Allow compressed air to enter the system slowly so that counterpressure builds up gradually.

4. Contact SCHUNK (see chapter 12 page 16) if the product is to be used under one of the following conditions:

- Conditions and environments that lie outside the stated specifications, or where the product is to be used outdoors.
- Installation in equipment in conjunction with nuclear power, railways, aerospace, vehicles, medical equipment, food and drink, leisure equipment, emergency shutdown circuits, applications in presses or safety equipment.
- Any application that may possibly have negative influences on persons, animals or property and that requires a special safety analysis.

5. This user manual should always be easily accessible.

1.4 Indications to the operating manual

This user manual describes linear actuators of series LM 25, LM 50, LM 100, LM 200 and LM 300.
All statements in this user manual refer to the types stated above.

2 Warranty

The warranty period is 24 months or 40 million load cycles after delivery date from the factory, assuming use in single-shift operation and that the recommended maintenance and lubrication intervals are respected. Components that come into contact with workpieces, wearing parts, shock absorbers, stop screws and proximity switches are never included in the warranty.
The warranty covers the replacement or repair of defective parts in the manufacturing plant. Further claims are hereby excluded. In this context, please also see our General Terms and Conditions.

3 Scope of Delivery

The scope of delivery comprises

- Linear actuator LM, depending on the version ordered

4 Technical Data

Please consult our catalogue for further technical details. The last version is valid in each case. (in accordance with Chapter 2.3 General Terms and Conditions)

The airborne sound emitted from the unit is <= 70dB(A)

5 Operating and environmental conditions

- Do not use the product in environments comprising corrosive gases, salt water, water or vapours.
- For use in an atmosphere where water drops, oil, sprays etc, occur take appropriate countermeasures in order to ensure protection.
- If electronic end switches are to be used, these should not be used in the presence of strong magnetic fields.
- Please contact SCHUNK (see chapter 12 page 16) if the product is to be used in the presence of strong magnetic fields.
- Do not use the linear actuator in an atmosphere in which it could come into contact with fluids such as oil or water.
- Do not use the linear actuator in an atmosphere in which it could come into direct contact with substances such as powder dust, dust, sprays etc.
- Do not use the linear actuator in an atmosphere in which sources of heat are present.
- Do not subject the linear actuator to excessive vibrations and/or shocks.

6 Assembly and Installation

6.1 Design precautions

- A protective guard is recommended in order to minimise the risk of injury.
- Ensure that loose, fixed and/or connected parts or tightened securely.
- Due to the high levels of kinetic energy, shock absorbers must be used.
- Take account of the possibility that the operating pressure may decrease as a result of power failures etc.
- Pay attention to the possibility of the failure of power supplies.
- Mount the compressed air supply in such a way as to prevent sudden extension of the system.
- Pay attention to emergency shutdown facilities.
- Pay attention to what will happen after an emergency stop or abnormal stoppage. Ensure that nobody can be placed at risk or be injured when equipment is restarted.

6.2 Compressed air supply

- Use clean compressed air and insert a filter between the supply and the pneumatic system.
- Install a water separator in the pneumatic system.
- Use the product only within the range specified for the medium temperature and ambient temperature.

Air specification
- dry (free from condensation)
- filtered to 10 microns
- oiled or oil-free

6.3 Special connecting measures

- Use connecting pipes of a cross-section that is larger than or identical to that of the connector thread.
- Blow air through the connecting pipes before fitting the devices in order to remove any dust, contaminant or particles.
- Avoid the ingress of sealing material into the pipe network.
- Do not remove pneumatic components from their packaging until shortly before fitting.

6.4 Assembly measures

- During the mounting of loads, do not allow the system to be subjected to impermissible forces or moments.
- The flatness of the mounting surfaces must be less than 0.02mm.
- Select the correct means of connection with a load that has its own guidance mechanism and ensure that this is adequately aligned.
- Avoid contact with the linear actuator during operation.
- Select a suitable screw tightening torque for mounting of the linear actuator or loads on the linear actuator in accordance with the generally valid guidelines for screw connections.

6.5 Measures for the initial operation

Please read this user manual carefully. Knowledge of this user manual is essential in order to prevent errors and ensure problem-free operation.

Under no circumstances may linear actuators be operated with oiled air if they are subsequently to be operated with oil-free air.

- Check the technical specifications.
- Do not use the device until you have checked that it functions correctly taking account of all permissible operating parameters.
- Regulate the operating speed of the cylinder by means of throttle type non-return valves. Increase from the low speed to higher speeds until the required operating speed is reached.

Selection and dimensioning

- Do not subject the units to loads that exceed the limits of their operating range. If excessive loads are applied, the guidance unit could suffer damage or inaccuracies. The maximum permissible loads are given in our standard catalogue.
- Do not allow the system to experience impermissible forces or shocks.

7 Handling

7.1 End position sets

The stop screw LMAS-... must only be used for short stroke lengths, low stroke speeds and low kinetic energy levels!
Shock absorber stops (LMST-...) should be used as standard.

The following components are available for limiting of stroke length, damping and detection of end positions:

- LMAS-... (Stop screw)
- LMST-... (Shock absorber stop)
- LMNS-... (Proximity switch - complete)

The diagram below shows the installation of LMST-... and LMNS-... in accordance with installation variant 1 (internal). For installation in accordance with installation variant 2 (external), the switching pin and damper adjustment mechanism are interchanged with LMST-... and LMNS-... (not in the case of LM 25)

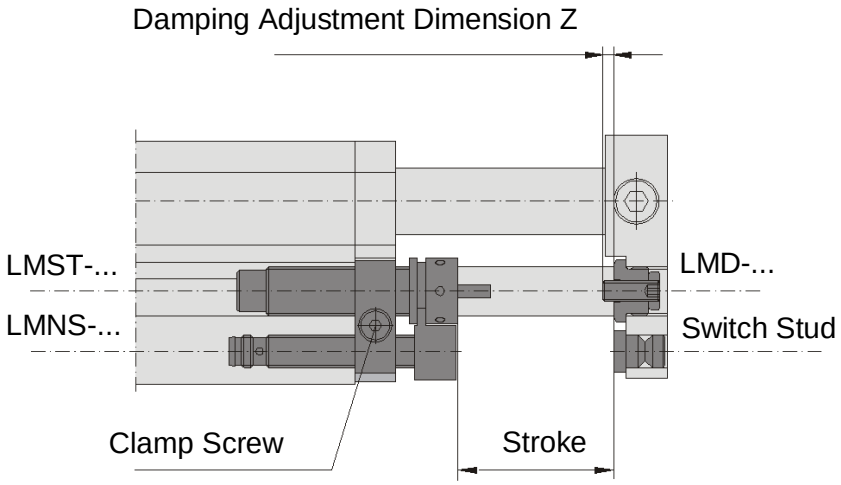


Figure 1: linear actuator end position sets

7.1.1 Adjustment of linear actuator stroke length

The stroke length of the linear actuator can be adjusted, after the clamping screw has been loosened, by adjusting the shock absorber stop and proximity switch jointly by means of a fine thread (not in the case of LM 25). Subsequent adjustment of the end position interrogation is not necessary. Once the required stroke length has been set, the clamping mechanism must be tightened again.

Max. permissible screw tightening torque for grade 8.8**:**

- LM 25 1.5Nm
- LM 50 1.5Nm
- LM 100 3.0Nm
- LM 200 5.9Nm
- LM 300 5.9Nm

The maximum possible end position adjustment is given in our standard catalogue.

7.1.2 Damping adjustment

The adjustment screw of the damper adjustment mechanism can be used to adjust the stroke of the shock absorber and thereby the damping curve to the kinetic energy occurring. The locknut is loosened and the appropriate setting value is adjusted by turning the adjustment screw.

The maximum and minimum setting values are given in our standard catalogue.

7.2 Intermediate stops ZZA

Intermediate stops are additional modules for linear actuators. Two designs are available for all LM linear actuators:

- **Design 1**: mounting on piston side of LM
- **Design 2**: mounting on rod side of LM

The diagram below shows design 1.
In design 2 the complete intermediate stop is mounted on the other side of the actuator. It is also possible to fit a linear actuator with one intermediate stop each of design 1 and design 2 (2 intermediate positions).

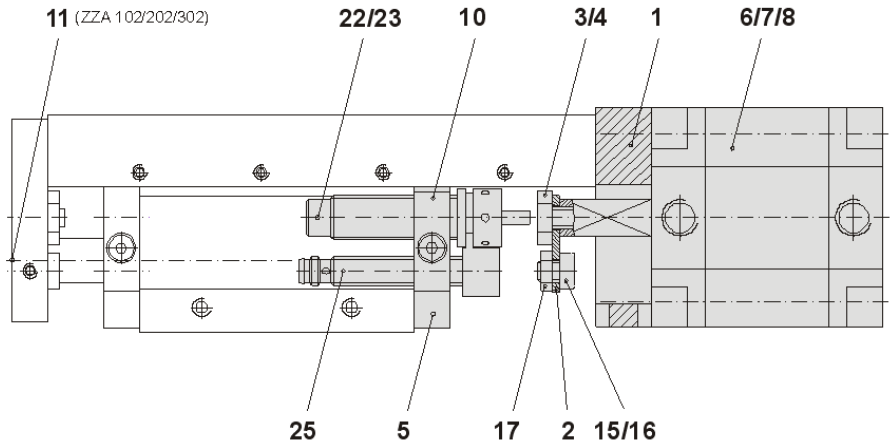


Figure 2: Intermediate stops - Design 1

The end position sets described in chapter 7.1 of this user manual can be used for limiting the stroke length, damping and interrogation of intermediate position.

The maximum possible adjustment of the intermediate position is given in our standard catalogue.

7.3 Intermediate stops LMZAW

LMZAW Intermediate stops are additional modules for linear actuators of series LM 100, LM 200 and LM 300. They can be mounted on either the piston side or rod side of the linear actuator.

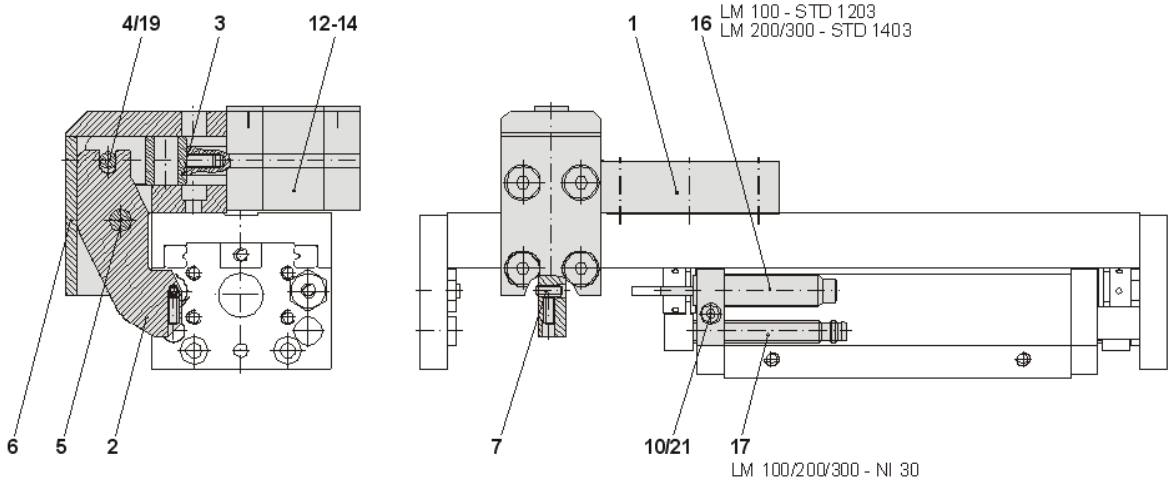
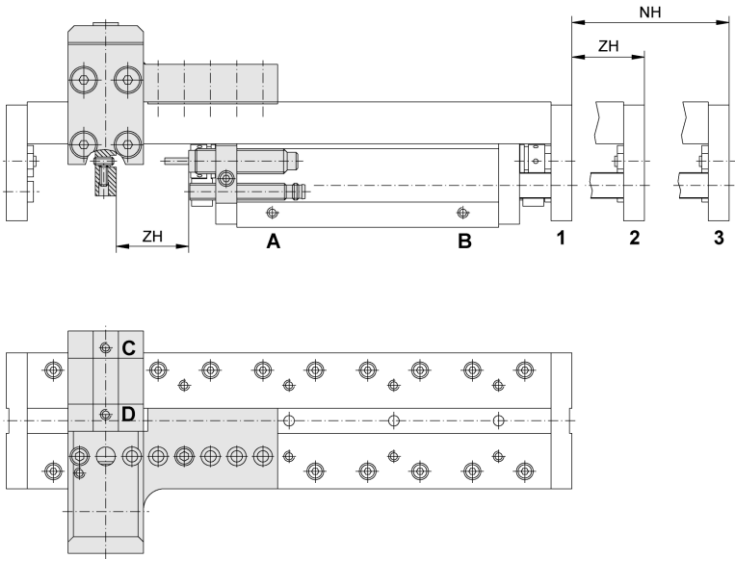


Figure 3: Intermediate stops LMZAW - mounting on the piston side

The intermediate position is steplessly adjustable within the permissible range. Shock absorbers (16), clamping piece (10) and two sensors for monitoring of the cylinders (12) are included in delivery.

To be fitted at the piston end

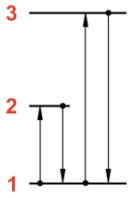


Homing of linear actuator (LMZAW)				
Stroke motion	**A**	**B**	**C**	**D**
Pos. 1 → Pos. 3	1	0	0	1
Pos. 3 → Pos. 1	0	1	0	1
Pos. 1 → Pos. 2	0	1	1	0
	1	0	1	0
Pos. 2 → Pos. 1	0	1	1	0
	0	1	0	1
Pos. 1 → Pos. 2	0	1	1	0
	1	0	1	0
Pos. 2 → Pos. 3	1	1	1	0
	1	1	0	1
	1	0	0	1

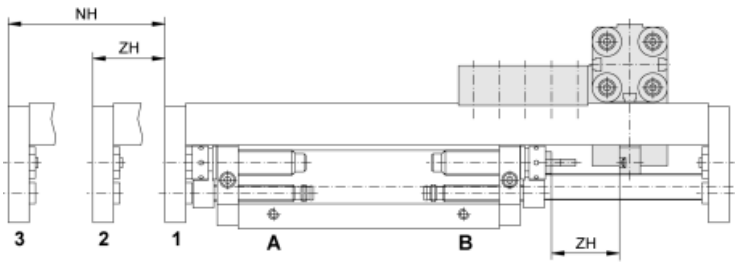
Permissible motion processes

Horizontal

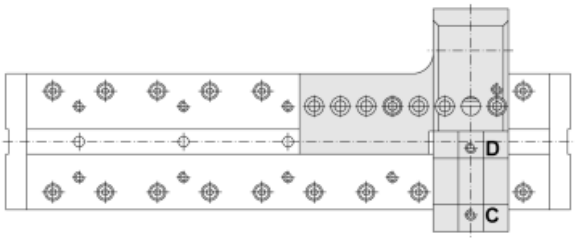
Vertical



To be fitted at the piston rod end

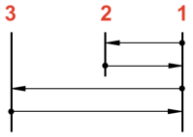


Homing of linear actuator (LMZAW)				
Stroke motion	**A**	**B**	**C**	**D**
Pos. 1 → Pos. 3	0	1	0	1
Pos. 3 → Pos. 1	1	0	0	1
Pos. 1 → Pos. 2	1	0	1	0
	0	1	1	0
Pos. 2 → Pos. 1	1	0	1	0
	1	0	0	1

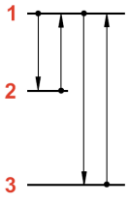


Permissible motion processes

Horizontal



Vertical



8 Repairs

The repair or elimination of defects on our products by the customer may only be carried out with our explicit written agreement. Any failure to adhere to this principle renders invalid our warranty and liability for any resulting warranty or secondary losses.

Following receipt and examination, all linear actuators of series LM can be repaired by SCHUNK.

9 Response to malfunctions

Malfunctions that are caused by defective components may only be remedied by replacement of these components.

Defective components may only be replaced by SCHUNK genuine replacement parts.

Malfunction	Cause	Remedy
Actuator does not move in/out	(1) No compressed air (2) Incorrect pneumatic connections	(1) Check compressed air (2) Check pneumatic elements
End position signal not present	(1) Initiator incorrectly set in relation to stop (2) Initiator defective (3) Broken cable	(1) Readjust initiator (2) Replace initiator (3) Replace initiator cable
Actuator impacts on end positions	(1) Damping incorrectly adjusted (2) Shock absorber defective (3) Ventilation valve defective (4) Stroke speed too high	(1) Adjust stop screw (2) Change shock absorber (3) Check ventilation valve (4) Set ventilation valve
Service load vibrates in end position	(1) Stroke speed too high (2) Inadequate damping (3) Unfavourable installation (4) Unfavourable CLM type	(1) Set ventilation valve (2) Optimise damper stroke (3) Check design (4) Use larger CLM type

10 Maintenance and Care

Under no circumstances may linear actuators be operated with oiled air if they are subsequently to be operated with oil-free air.

- The integral cylinders are lubricated for life and do not require relubrication. Operation with oiled or oil-free compressed air is permissible without restrictions.
- The crossed roller guidance systems are lubricated for life. It is not therefore necessary to lubricate these again before operation.
  Lubrication or relubrication with rolling bearing grease is recommended after running for approx. 3000km.
- All linear actuators of series LM are maintenance-free. In order to achieve the maximum operating life, this chapter and chapter 6.2 (at page 6) of this user manual should be observed.
- Apart from normal cleaning of machines, no further maintenance measures are necessary.

11 Replacement parts

11.1 LM 25

As a standardised wear part set, a seal set is available under ordering number LMDI 25. The scope of delivery includes all seals.

In accordance with the section drawing below, all other wear parts and individual parts are available as single items.

Ordering numbers are as indicated in the following example

- Part No. 1 LM 25 - H025 - 01

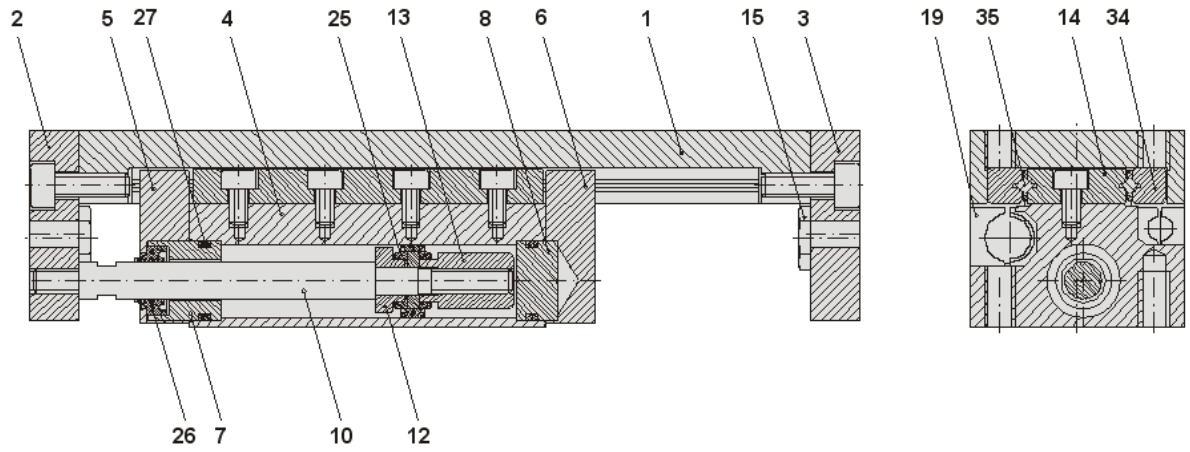


Figure 4: section drawing LM 25

11.2 LM 50, 100, 200 and 300

As standardised wear part sets, seal sets are available. The scope of delivery includes all seals and the plug (Pos. 07) for the rod side.
Ordering numbers are as indicated in the following example:

- LMDI 100 (for linear actuator of series LM 100)

In accordance with the section drawing below, all other wear parts and individual parts are available as single items.

Ordering numbers are as indicated in the following example

- Part No. 1 LM 100 - H075 - 01

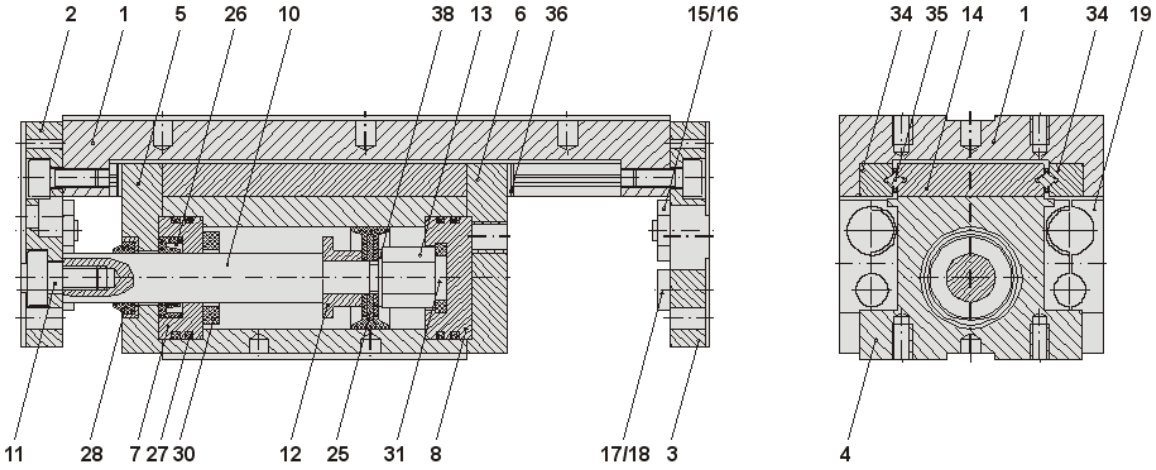


Figure 5: section drawing LM 50, 100

12 EC declaration of incorporation

In terms of the EC Machinery Directive 2006/42/EC, annex II B

Manufacturer/ distributor

SCHUNK GmbH & Co. KG.
Spann- und Greiftechnik
Bahnhofstr. 106 – 134
74348 Lauffen/Neckar, Germany

We hereby declare that the following product:

Product designation:	Linear actuator
Type designation:	LM 25…LM 300
ID number:	0314050…0314501

meets the applicable basic requirements of the Directive **Machinery (2006/42/EC)**.

The incomplete machine may not be put into operation until conformity of the machine into which the incomplete machine is to be installed with the provisions of the Machinery Directive (2006/42/EC) is confirmed.

Applied harmonized standards, especially:

EN ISO 12100-1	Safety of machines - Basic concepts, general principles for design -- Part 1: Basic terminology, methodology
EN ISO 12100-2	Safety of machines - Basic concepts, general principles for design -- Part 2: Technical principles

The manufacturer agrees to forward on demand the special technical documents for the incomplete machine to state offices.

The special technical documents according to Annex VII, Part B, belonging to the incomplete machine have been created.

Person responsible for documentation: Mr. Michael Eckert, Tel.: +49(0)7133/103-2204

Location, date/signature: Lauffen, Germany, January 2011 p.p.

Title of the signatory: Director for Development

13 Contact

GERMANY – HEAD OFFICE

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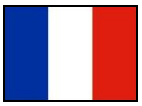

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Appendix 3

Linear actuator CLM

Mini-slide

Overall length is optimized, with pneumatic drive and pre-loaded crossed rollers with no backlash

Area of application

For use in assembly automation; for example, as pick & place solutions

Advantages – your benefits

Crossed roller guide design and solid construction
Guaranteed high load bearing capacities and end-position accuracy in all installation positions

Pre-loaded crossed roller guides
That means absolutely no backlash

High basic load ratings
In all load directions

Standardized fixing bores and connection dimensions identical for LM series
For numerous combinations with other GEMOTEC system elements

Shock absorber and proximity switch integrated in the projecting areas
For vibration-free movements and end-position monitoring

Level control by means of rod lock
For safety in case of emergency stops

Mounting pattern from rear surface (from CLM 25)
This means it can also be used as a linear unit

General information about the series

Guidance
Pre-loaded crossed roller bearings

Material
Aluminum, hard-anodized steel guide

Actuation
Pneumatic, via filtered compressed air (10 µm): dry, lubricated, or non-lubricated
Pressurizing medium: requirements for compressed air quality class according to DIN ISO 8573-1: Quality class 4

Ambient temperature range
From 5°C to 60°C

Operating pressure range
2 bar to 8 bar

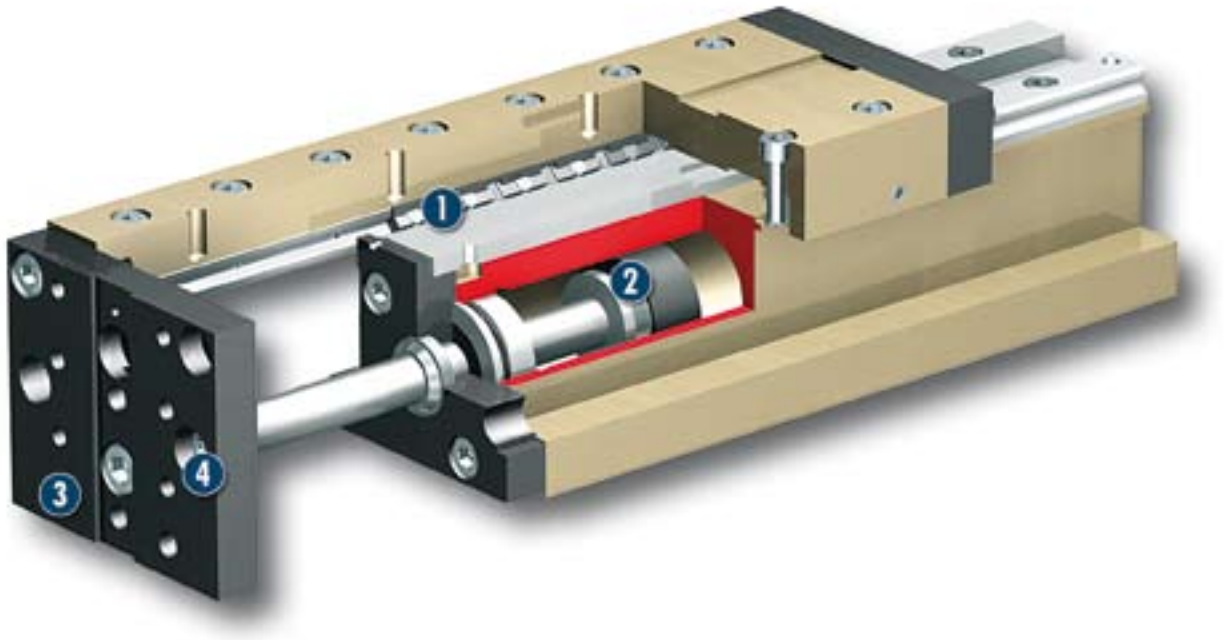
Scope of delivery
Including shock absorbers

Warranty
24 months

Rod lock
Can be retrofitted by the manufacturing location or using a kit

For production reasons, the colors may vary from those shown in the catalog.

Cross-section of function



1 **Crossed roller guide**
With wiper, pre-loaded, and without backlash

2 **Drive**
Powerful piston rod cylinder

3 **Modular design hole pattern**
Completely integrated in the module system

4 **Dampening adjustment**
Adjustment of the dampening characteristic

Description of function

The upper part of the slide moves out and in linearly. The drive is a compressed-air driven piston.

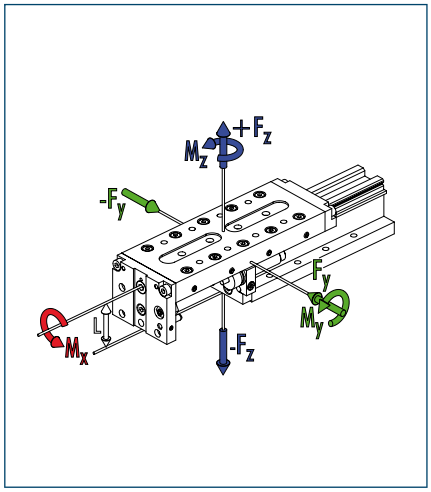
Options and special information

Fall protection version
Prevents the structure from falling in the event of a sudden loss of energy.

This module can be combined as standard with many elements from the modular system. You can find more information in the “Accessories” chapter.

CLM 100

Moment load



L = 44 mm

ⓘ The forces and moments shown here are maximum values for individual loading. If more than one force or moment occurs simultaneously, the application can be calculated by the TOOLBOX sizing software.

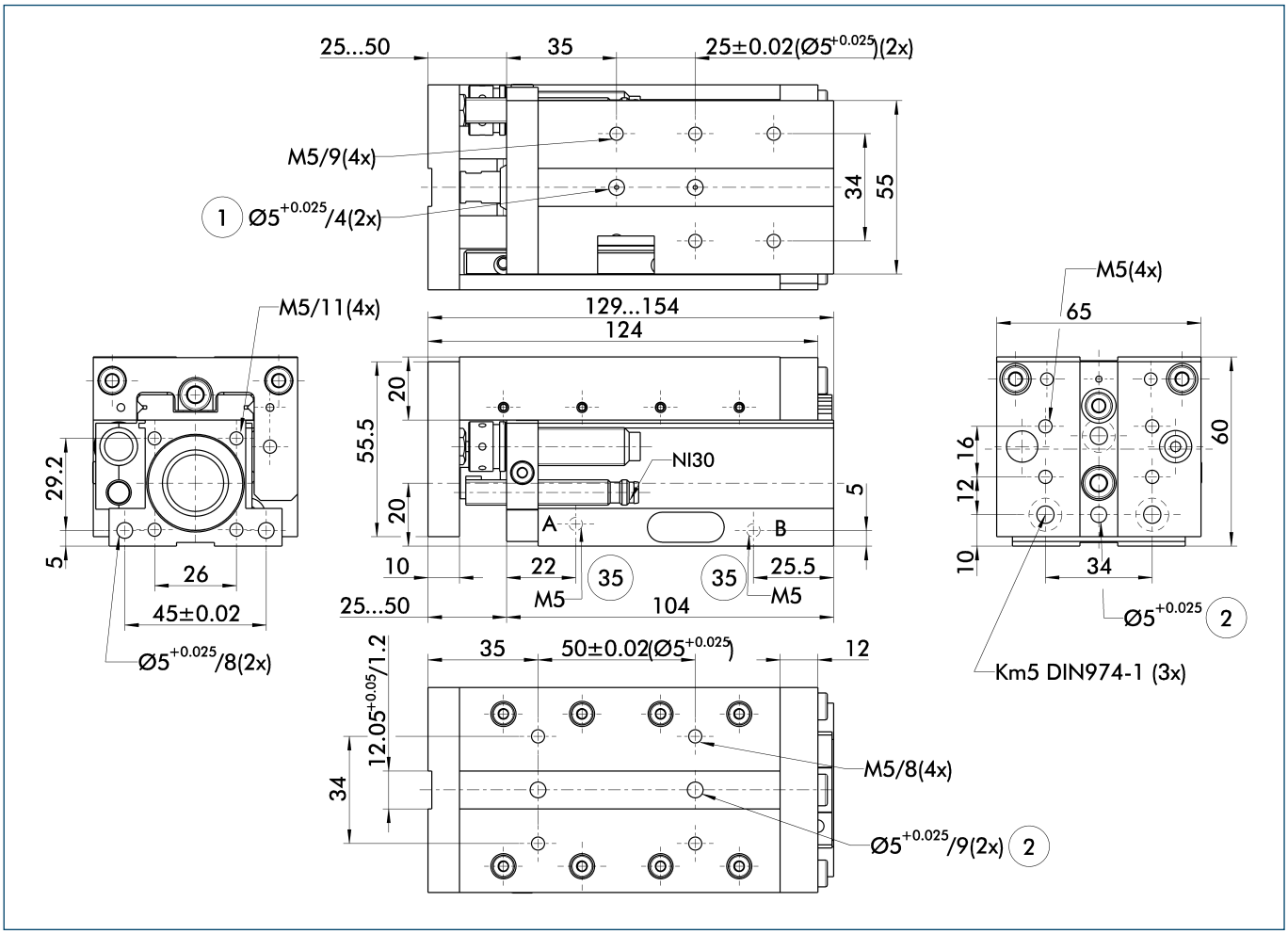
Designation	F_z	M_x	M_y	M_z
	[N]	[Nm]	[Nm]	[Nm]
CLM 100-H025	812	28.2	26.4	13.2
CLM 100-H050	734	34	33.1	16.55
CLM 100-H075	684	39.4	39.7	19.85
CLM 100-H100	658	44.6	46.3	23.15

ⓘ Force F_y must be calculated by the TOOLBOX sizing software.

Technical data

Designation		CLM 100-H025	CLM 100-H050	CLM 100-H075	CLM 100-H100
	ID	0314041	0314042	0314043	0314044
Stroke length	[mm]	25	50	75	100
Extend force [FV] at 6 bar	[N]	294	294	294	294
Retract force [FR] at 6 bar	[N]	247	247	247	247
Piston diameter	[mm]	25	25	25	25
Rod diameter	[mm]	10	10	10	10
Overall length	[mm]	129	167	204	242
Mass	[kg]	1.45	1.75	2.1	2.4
Fluid consumption/10 mm stroke	[cm^3]	4.9	4.9	4.9	4.9
Minimum pressure	[bar]	3	3	3	3
Maximum pressure	[bar]	8	8	8	8
Nominal operating pressure	[bar]	6	6	6	6
IP rating		40	40	40	40
Min. ambient temperature	[°C]	5	5	5	5
Max. ambient temperature	[°C]	60	60	60	60
Repeat accuracy	[mm]	± 0.01	± 0.01	± 0.01	± 0.01
Horizontal travel time at 5 kg additional load	[s]	0.11	0.15	0.18	0.21
Vertical travel time at 5 kg additional load	[s]	0.11	0.15	0.18	0.21
OPTIONS and their characteristics					
Fall protection version	**ID**		**0314442**	**0314443**	**0314444**
Designation			**CLM 100-H050-ASP**	**CLM 100-H075-ASP**	**CLM 100-H100-ASP**
Stroke loss of nominal stroke (on the rod side)	[mm]		12	12	12
Mass	[kg]		1.82	2.17	2.47
Static holding force	[N]		350	350	350
Max. axial backlash of the clamping	[mm]		0.25	0.25	0.25
ZZA intermediate stop on the rod side possible			No	No	No
ZZA intermediate stop on the piston side possible			No	No	No
LMZAW intermediate stop possible			No	No	No

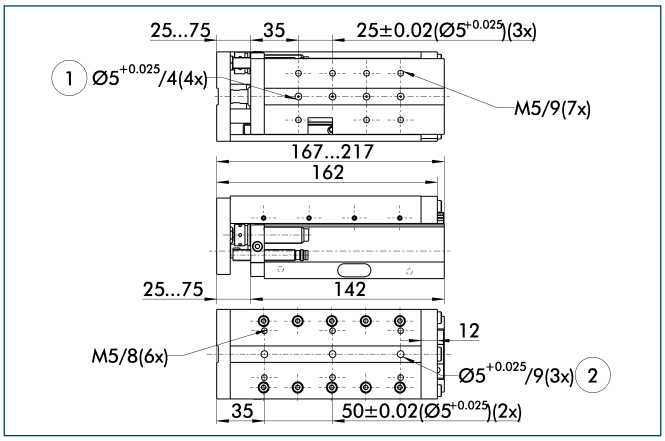
Main views, CLM 100-H025



A, a Main and direct connections, extend linear unit
B, b Main and direct connections, retract linear unit
1 Connection, linear unit
2 Connection of the assembly
35 Back

The linear module can be fastened either to the base body or the slide. The structure can also optionally be fastened to either the slide or the base body. This view shows the mounting of the module to the base body and the mounting of the structure to the slide.

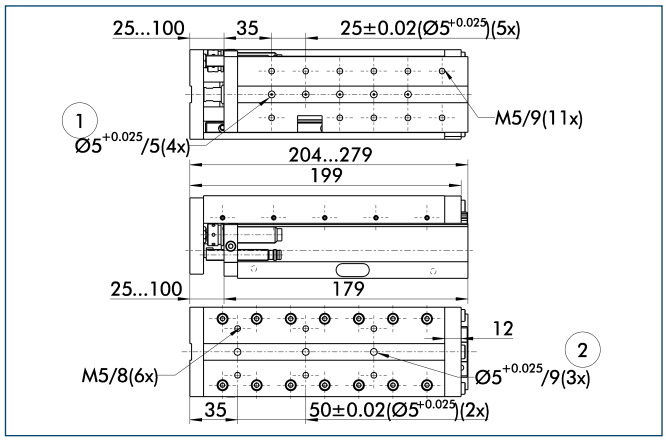
Variant CLM 100-H050



1 Connection, linear unit
2 Connection of the assembly

Not all dimensions shown can be seen in the main view.

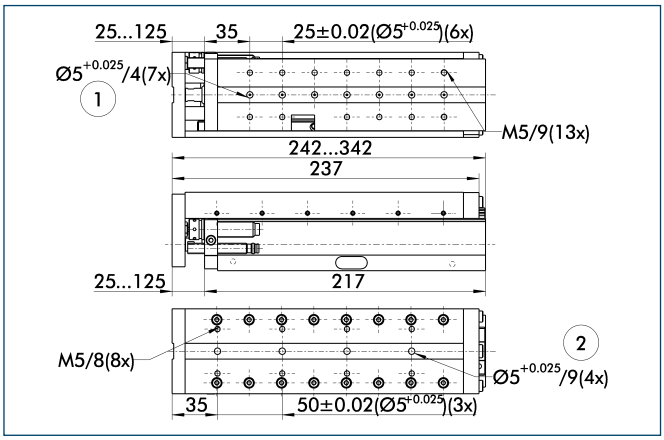
Variant CLM 100-H075



1 Connection, linear unit
2 Connection of the assembly

Not all dimensions shown can be seen in the main view.

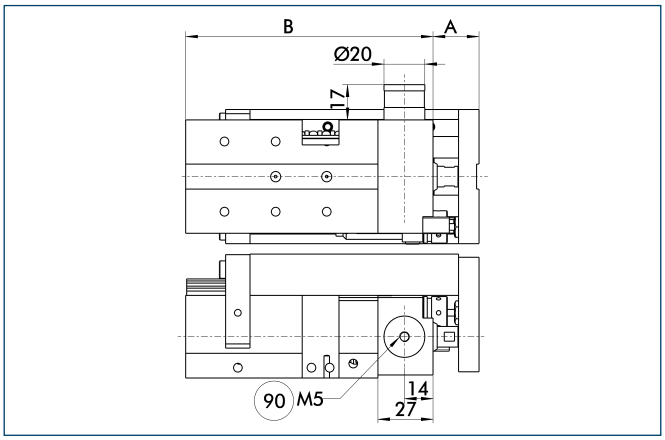
Variant CLM 100-H100



(1) Connection, linear unit
(2) Connection of the assembly

Not all dimensions shown can be seen in the main view.

Rod lock



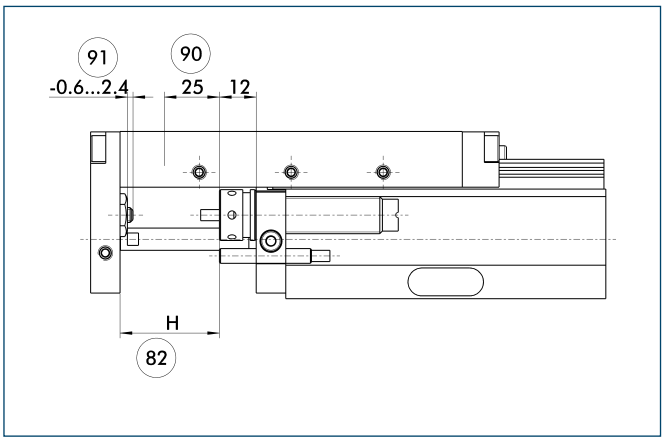
(90) Air connection, rod lock

Variable dimensions of rod lock

Type	Stroke [mm]	A [mm]	B [mm]
CLM 100-H050	33	25...58	159
CLM 100-H075	58	25...83	196
CLM 100-H100	83	25...108	234

The rod lock prevents weights from falling in the event of energy loss, such as emergency stop situations. The rod lock can also be retrofitted, but this will reduce the useful stroke.

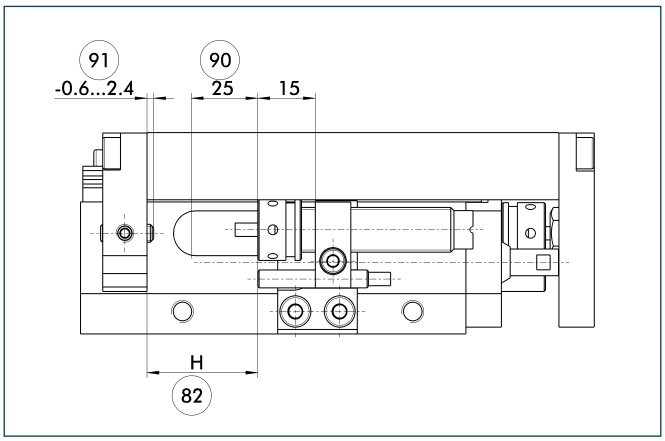
Fine adjustment, on the piston rod side



(82) Stroke
(90) Stroke adjustment range
(91) Dampening stroke adjustment range

This illustration shows the possibility of the “Return” stroke fine adjustment.

Fine adjustment, on the piston side

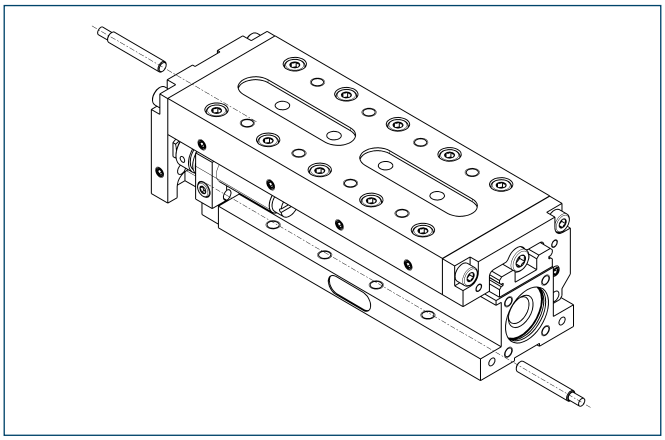


(82) Stroke
(90) Stroke adjustment range
(91) Dampening stroke adjustment range

This illustration shows the possibility of the “Extend” stroke fine adjustment.

You can find further information and components for the accessories mentioned here in the “Accessories” part of the catalog.

Sensor systems



End-position monitoring:
Inductive proximity switch, can be directly mounted

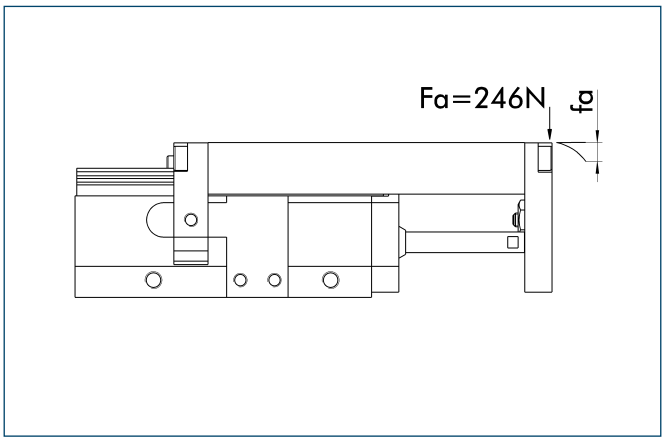
Designation	ID	Remark
NI 30-KT	0313429	For basic version
NI 32	0313425	For ASP version

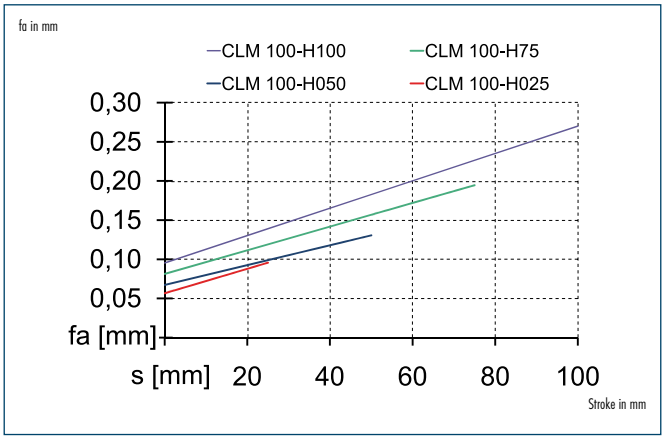
Extension cable for proximity switch

Designation	ID	Remark
STV 20	0313433	Sleeve M8x1, angled

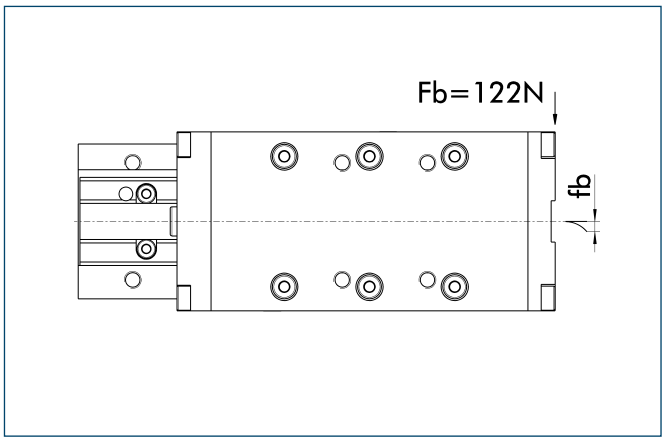
ⓘ Generally, two sensors are needed for each linear unit.

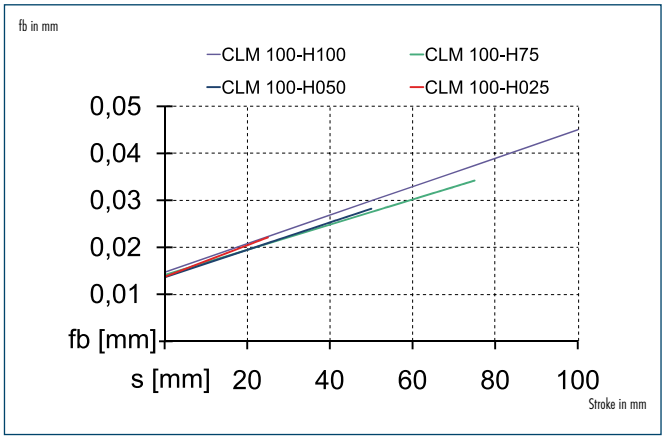
Deflection under load: fa





Deflection under load: fb





You can find further information and components for the accessories mentioned here in the “Accessories” part of the catalog.

LINEAR ACTUATOR
TYPES
CLM 25 TO
CLM 200

Dear Customer,

Congratulations on choosing a SCHUNK product. By choosing SCHUNK, you have opted for the highest precision, top quality and best service.

You are going to increase the process reliability of your production and achieve best machining results – to the customer's complete satisfaction.

SCHUNK products are inspiring.
Our detailed assembly and operation manual will support you.

Do you have further questions? You may contact us at any time – even after purchase. You can reach us directly at the mentioned addresses in the last chapter of these instructions.

Kindest Regards,

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1. Safety

1.1. Symbol Key

You will find this symbol wherever **hazards for persons** or **damage to the product** are possible.

This symbol indicates **important information** on the product or its handling.

1.2. Appropriate Use

The unit must only be used within the scope of its technical data. Appropriate use also includes compliance with the conditions the manufacturer has specified for commissioning, assembly, operation, environment and maintenance. Using the unit with disregard to even a minor specification will be deemed inappropriate use. The manufacturer assumes no liability for any injury or damage resulting from inappropriate use.

The linear actuators are manufactured in accordance with the current level of technology and with recognised safety regulations. During their use, however, there may occur risks to life and limb of the user or impairment of the portal actuator and other material assets.

The linear actuators are intended exclusively for the linear movement of service loads in any position that do not react in their manipulation with any risk to persons, property or the environment.

The maximum permissible service loads and forces are given in our standard catalogue.
Any usage beyond these definitions is inappropriate.
The manufacturer cannot be held liable for loss or damage arising therefrom. The risk is borne exclusively by the user.

The linear actuator must only be operated by persons that are familiar therewith and that have been instructed in the associated hazards. The relevant accident prevention regulations and the other generally recognised safety and occupational health regulations must be complied with.

1.3. Safety Notes

1. Responsibility for the compatibility of pneumatic equipment lies with the person who designs the pneumatic system or takes the decision on its specifications.

- Since the products specified herein can be used under various operating conditions, their compatibility with the appropriate pneumatic system must be based on specifications and/or tests in order to conform to their requirements.

2. Machines and equipment operated by pneumatic means may only be used by trained personnel.

- Compressed air can be hazardous if an operator is not familiar with its use. The assembly, handling or repair of pneumatic systems is to be undertaken by trained and experienced personnel.

3. Do not carry out maintenance work on machines and equipment and do not attempt to remove components until it has been confirmed that it is safe to do so.

- Inspection and maintenance of machines and equipment may only be carried out after it has been confirmed that the devices that must be switched off are in a securely deactivated condition.
- If machine parts must be removed, carry out safety precautions as mentioned above. Deactivate the compressed air supply to this machine and release any remaining compressed air from the system.
- Before machines and equipment are switched on again, take measures to ensure that cylinder rods etc. are not pushed outwards. Allow compressed air to enter the system slowly so that counterpressure builds up gradually.

4. Contact SCHUNK (see chapter 14 page 15) if the product is to be used under one of the following conditions:

- Conditions and environments that lie outside the stated specifications, or where the product is to be used outdoors.
- Installation in equipment in conjunction with nuclear power, railways, aerospace, vehicles, medical equipment, food and drink, leisure equipment, emergency shutdown circuits, applications in presses or safety equipment.
- Any application that may possibly have negative influences on persons, animals or property and that requires a special safety analysis.

5. This user manual should always be easily accessible.

1.4. Indications to the operating manual

This user manual describes linear actuators of series CLM 25, 50, 100 and 200.
All statements in this user manual refer to the types stated above.

2. Warranty

The warranty period is 24 months or 40 million load cycles after delivery date from the factory, assuming use in single-shift operation and that the recommended maintenance and lubrication intervals are respected. Components that come into contact with workpieces, wearing parts, shock absorbers, stop screws and proximity switches are never included in the warranty.
The warranty covers the replacement or repair of defective parts in the manufacturing plant. Further claims are hereby excluded. In this context, please also see our General Terms and Conditions.

3. Scope of Delivery

The scope of delivery comprises

- Linear actuator CLM, depending on the version ordered

4. Technical Data

Please consult our catalogue for further technical details. The last version is valid in each case. (in accordance with Chapter 2.3 General Terms and Conditions)

The airborne sound emitted from the unit is <= 70dB(A)

5. Operating and environmental conditions

- Do not use the product in environments comprising corrosive gases, salt water, water or vapours.
- For use in an atmosphere where water drops, oil, sprays etc, occur take appropriate countermeasures in order to ensure protection.
- If electronic end switches are to be used, these should not be used in the presence of strong magnetic fields.
- Please contact SCHUNK (see chapter 14 page 15) if the product is to be used in the presence of strong magnetic fields.
- Do not use the linear actuator in an atmosphere in which it could come into contact with fluids such as oil or water.
- Do not use the linear actuator in an atmosphere in which it could come into direct contact with substances such as powder dust, dust, sprays etc.
- Do not use the linear actuator in an atmosphere in which sources of heat are present.
- Do not subject the linear actuator to excessive vibrations and/or shocks.

6. Assembly and Installation

6.1. Design precautions

- A protective guard is recommended in order to minimise the risk of injury.
- Ensure that loose, fixed and/or connected parts or tightened securely.
- Due to the high levels of kinetic energy, shock absorbers must be used.
- Take account of the possibility that the operating pressure may decrease as a result of power failures etc.
- Pay attention to the possibility of the failure of power supplies.
- Mount the compressed air supply in such a way as to prevent sudden extension of the system.
- Pay attention to emergency shutdown facilities.
- Pay attention to what will happen after an emergency stop or abnormal stoppage. Ensure that nobody can be placed at risk or be injured when equipment is restarted.

6.2. Compressed air supply

- Use clean compressed air and insert a filter between the supply and the pneumatic system.
- Install a water separator in the pneumatic system.
- Use the product only within the range specified for the medium temperature and ambient temperature.

Air specification
- dry (free from condensation)
- filtered to 10 microns
- oiled or oil-free

6.3. Special connecting measures

- Use connecting pipes of a cross-section that is larger than or identical to that of the connector thread.
- Blow air through the connecting pipes before fitting the devices in order to remove any dust, contaminant or particles.
- Avoid the ingress of sealing material into the pipe network.
- Do not remove pneumatic components from their packaging until shortly before fitting.

6.4. Assembly measures

- During the mounting of loads, do not allow the system to be subjected to impermissible forces or moments.
- The flatness of the mounting surfaces must be less than 0.02mm.
- Select the correct means of connection with a load that has its own guidance mechanism and ensure that this is adequately aligned.
- Avoid contact with the linear actuator during operation.
- Select a suitable screw tightening torque for mounting of the linear actuator or loads on the linear actuator in accordance with the generally valid guidelines for screw connections.

6.5. Measures for the initial operation

Please read this user manual carefully. Knowledge of this user manual is essential in order to prevent errors and ensure problem-free operation.

Under no circumstances may linear actuators be operated with oiled air if they are subsequently to be operated with oil-free air.

- Check the technical specifications.
- Do not use the device until you have checked that it functions correctly taking account of all permissible operating parameters.
- Regulate the operating speed of the cylinder by means of throttle type non-return valves. Increase from the low speed to higher speeds until the required operating speed is reached.

Selection and dimensioning

- Do not subject the units to loads that exceed the limits of their operating range. If excessive loads are applied, the guidance unit could suffer damage or inaccuracies. The maximum permissible loads are given in our standard catalogue.
- Do not allow the system to experience impermissible forces or shocks.

7. Handling

7.1. End position sets

The stop screw LMAS-... must only be used for short stroke lengths, low stroke speeds and low kinetic energy levels!
Shock absorber stops LMST-... should be used as standard.

The following components are available for limiting of stroke length, damping and detection of end positions:

- LMAS-... (Stop screw)
- LMST-... (Shock absorber stop)
- NI-... (Proximity switch)

The drawing below shows the installation of LMST-.. and NI-...

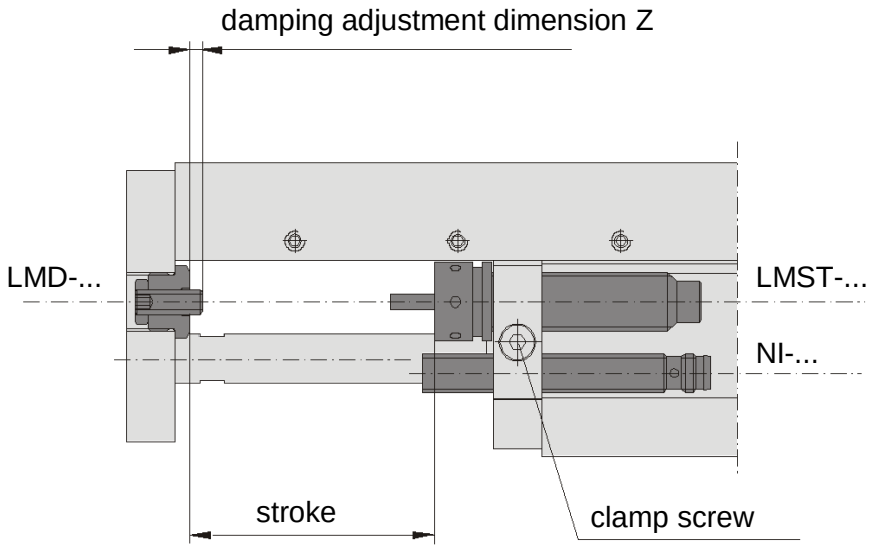

Figure 1: linear actuator end position sets

7.1.1. Adjustment of linear actuator stroke length

The stroke length of the linear actuator can be adjusted, after the clamping screw has been loosened, by adjusting the shock absorber stop LMST and proximity switch NI. Once the required stroke length has been set, the clamping mechanism must be tightened again.

Max. permissible screw tightening torque for grade 8.8:

- CLM 25 1.5Nm
- CLM 50 1.5Nm
- CLM 100 3.0Nm
- CLM 200 5.9Nm

The maximum possible end position adjustment is given in our standard catalogue.

7.1.2. Damping adjustment

The adjustment screw of the damper adjustment mechanism LMD can be used to adjust the stroke of the shock absorber and thereby the damping curve to the kinetic energy occurring. The locknut / clamping screw is loosened and the appropriate setting value is adjusted by turning the adjustment screw.

The maximum and minimum setting values are given in our standard catalogue.

8. Repairs

The repair or elimination of defects on our products by the customer may only be carried out with our explicit written agreement. Any failure to adhere to this principle renders invalid our warranty and liability for any resulting warranty or secondary losses.

Following receipt and examination, all linear actuators of series CLM can be repaired by SCHUNK.

9. Response to malfunctions

Malfunctions that are caused by defective components may only be remedied by replacement of these components.

Defective components may only be replaced by SCHUNK genuine replacement parts.

Malfunction	Cause	Remedy
Actuator does not move in/out	(1) No compressed air (2) Incorrect pneumatic connections	(1) Check compressed air (2) Check pneumatic elements
End position signal not present	(1) Initiator incorrectly set in relation to stop (2) Initiator defective (3) Broken cable	(1) Readjust initiator (2) Replace initiator (3) Replace initiator cable
Actuator impacts on end positions	(1) Damping incorrectly adjusted (2) Shock absorber defective (3) Ventilation valve defective (4) Stroke speed too high	(1) Adjust stop screw (2) Change shock absorber (3) Check ventilation valve (4) Set ventilation valve
Service load vibrates in end position	(1) Stroke speed too high (2) Inadequate damping (3) Unfavourable installation (4) Unfavourable CLM type	(1) Set ventilation valve (2) Optimise damper stroke (3) Check design (4) Use larger CLM type

10. Maintenance and Care

⚠ **Under no circumstances may linear actuators be operated with oiled air if they are subsequently to be operated with oil-free air.**

- The integral cylinders are lubricated for life and do not require relubrication. Operation with oiled or oil-free compressed air is permissible without restrictions.
- The crossed roller guidance systems are lubricated for life. It is not therefore necessary to lubricate these again before operation.
  Lubrication or relubrication with rolling bearing grease is recommended after running for approx. 3000km.
- All linear actuators of series CLM are maintenance-free. In order to achieve the maximum operating life, this chapter and chapter 6.2 (at page 6) of this user manual should be observed.
- Apart from normal cleaning of machines, no further maintenance measures are necessary.

11. Replacement parts

11.1. CLM 25

As a standardised wear part set, a seal set is available under ordering number CLMDI 25. The scope of delivery includes all seals.

In accordance with the section drawing below, all other wear parts and individual parts are available as single items.

Ordering numbers are as indicated in the following example

- Part No. 1 CLM 25 - H025 - 01

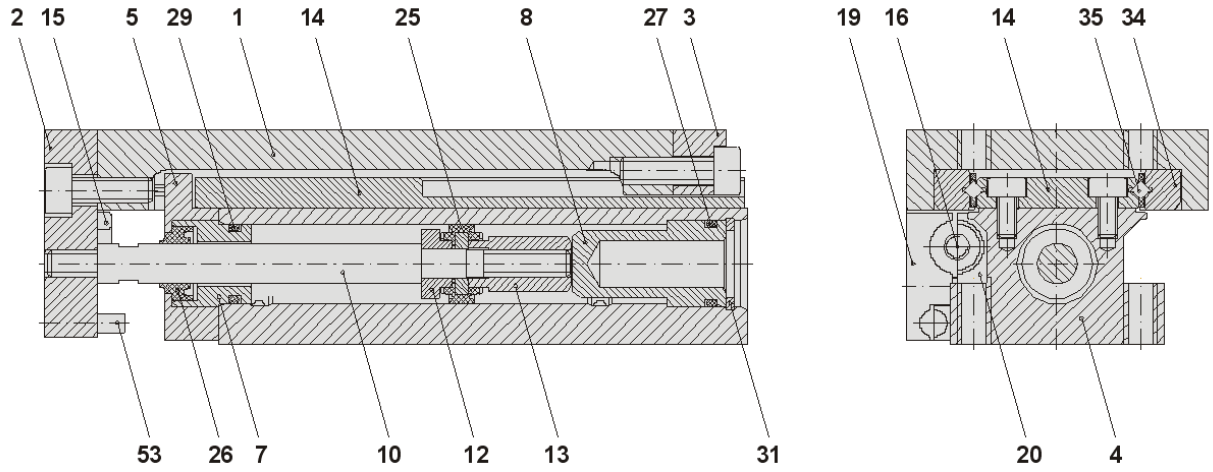

Figure 2: section drawing CLM 25

11.2. CLM 50, 100, 200

As standardised wear part sets, seal sets are available. The scope of delivery includes all seals. Ordering numbers are as indicated in the following example:

- CLMDI 100 (for linear actuator of series CLM 100)

In accordance with the section drawing below, all other wear parts and individual parts are available as single items.

Ordering numbers are as indicated in the following example

- Part No. 1 CLM 100 - H075 - 01

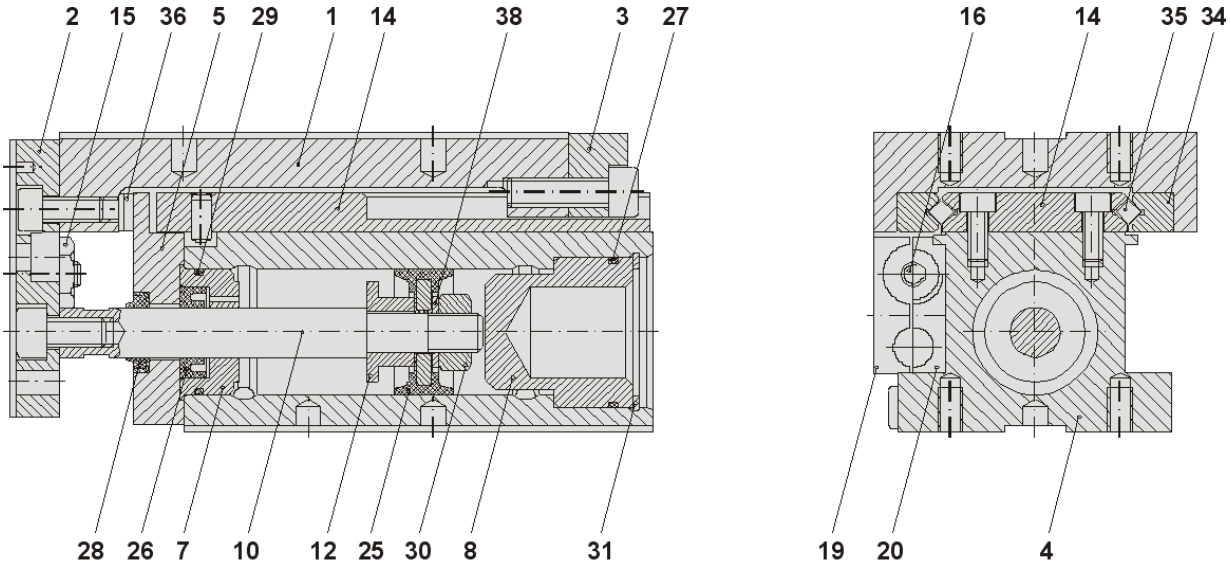

Figure 3: section drawing CLM 50, 100, 200

12. EC declaration of incorporation

In terms of the EC Machinery Directive 2006/42/EC, annex II B

Manufacturer/ distributor	SCHUNK GmbH & Co. KG. Spann- und Greiftechnik Bahnhofstr. 106 – 134 74348 Lauffen/Neckar, Germany

We hereby declare that the following product:

Product designation	Linear actuator
Type designation:	CLM 25…CLM 200
ID number:	0314035…0314447

meets the applicable basic requirements of the Directive **Machinery (2006/42/EC)**.

The incomplete machine may not be put into operation until conformity of the machine into which the incomplete machine is to be installed with the provisions of the Machinery Directive (2006/42/EC) is confirmed.

Applied harmonized standards, especially:

EN ISO 12100-1	Safety of machines - Basic concepts, general principles for design -- Part 1: Basic terminology, methodology
EN ISO 12100-2	Safety of machines - Basic concepts, general principles for design -- Part 2: Technical principles

The manufacturer agrees to forward on demand the special technical documents for the incomplete machine to state offices.

The special technical documents according to Annex VII, Part B, belonging to the incomplete machine have been created.

Person responsible for documentation: Mr. Michael Eckert, Tel.: +49(0)7133/103-2204

Location, date/signature: Lauffen, Germany, January 2011 p.p.

Title of the signatory: Director for Development

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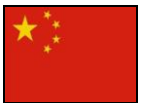

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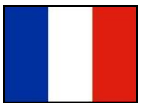

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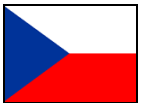

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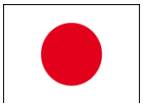

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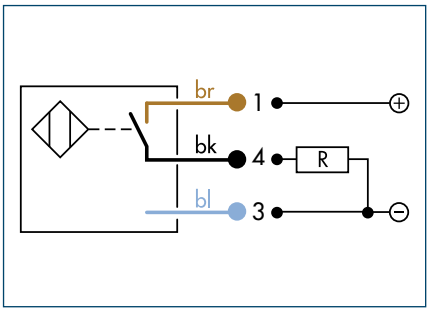
Appendix 4

Sensors

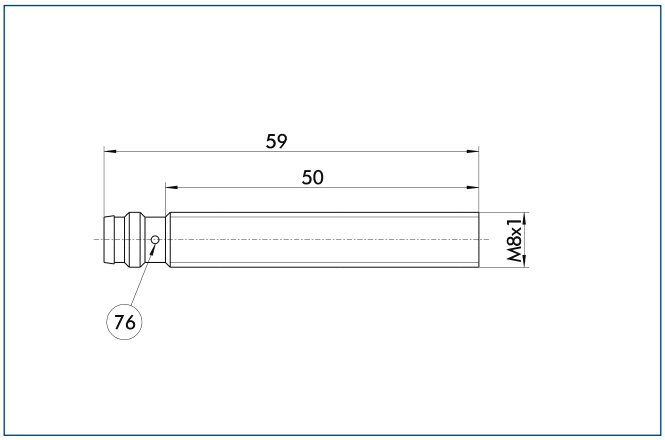
Circuit diagram, closer



Technical data

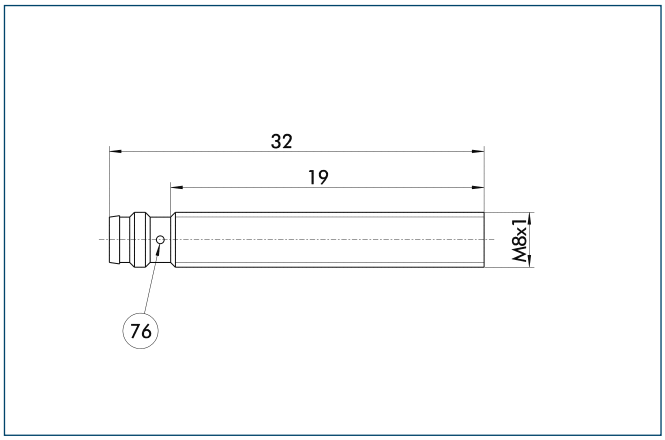
Designation		NI 30	NI 31	NI 40
	ID	0313430	0313505	0313431
Switching function		Closer	Closer	Closer
Switching distance	[mm]	1.5	1.5	1.5
Switching hysteresis from nominal switch-		< 15 %	< 15 %	< 20 %
Type of switching		PNP	PNP	PNP
Plugs		M8	M8	M8
Voltage type		DC	DC	DC
Rated voltage	[V]	24	24	24
Min. voltage	[V]	10	10	10
Max. voltage	[V]	35	35	30
Own current consumption	[mA]	< 15	< 15	< 10
Max. load current	[mA]	300	200	200
Min. ambient temperature	[°C]	-25	-25	-25
Max. ambient temperature	[°C]	70	70	70
Max. switching frequency	[Hz]	5000	5000	1000
IP rating (plug, plugged)		65	67	67

Sensor, NI 30



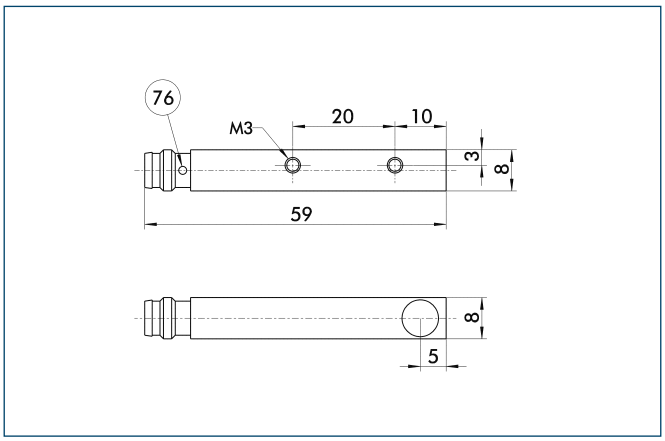
76 LED

Sensor, NI 31



76 LED

Sensor, NI 40



76 LED

Appendix 5

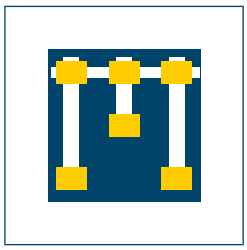
Pillar assembly system

Assembly systems

Assembly systems

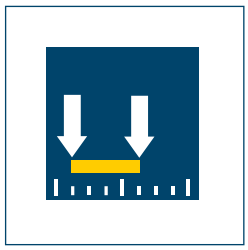
Assembly systems · Pillar profile modular system

Sizes
020 .. 055



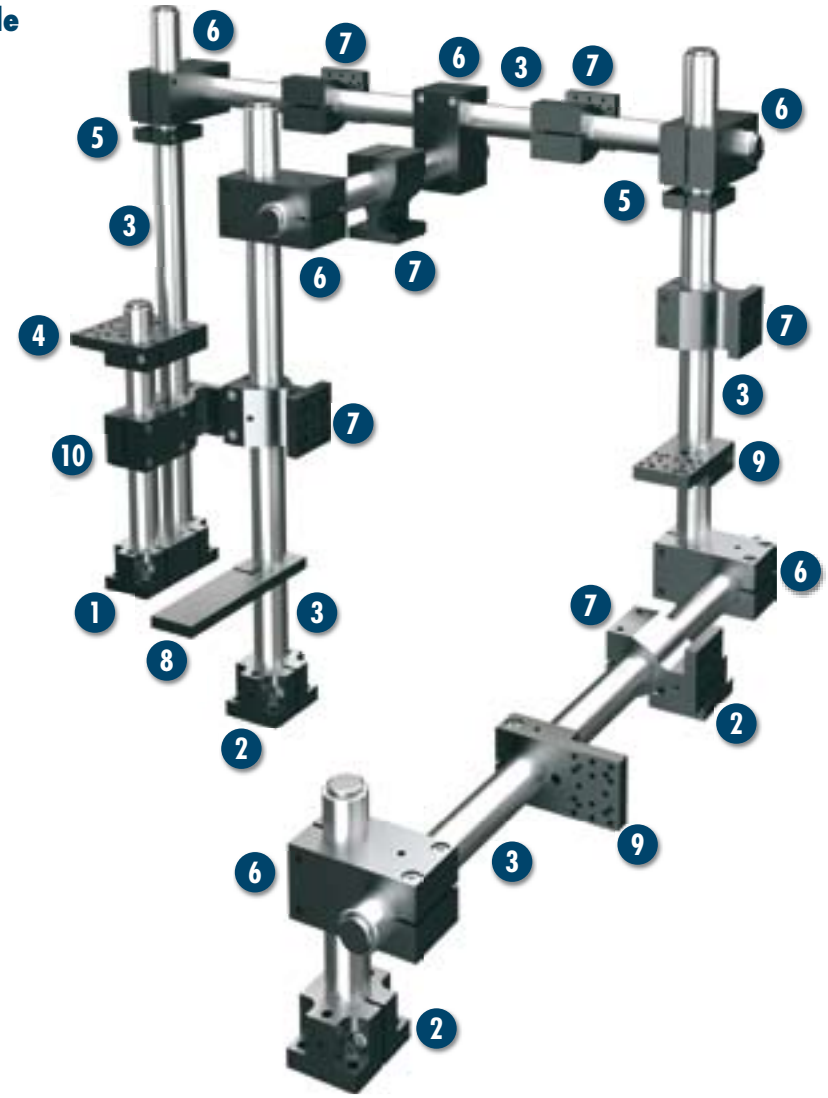
Clamping elements
max. 9

Pillar length
max. 3000 mm



Shape and positional tolerances
0.05

Application example



Versatile pillar profile modular system, Ø 35 mm, with horizontal and vertical mounting plates which can be used for the GEMOTEC system or for other assemblies

1. Double socket, SOD 035
2. Single base support, SOE 035
3. Hollow pillar, SLH 035-...
4. Double mounting plate, horizontal, APDH 035
5. Set collar, STR 035
6. Cross connector, KVB 035
7. Single mounting plate, vertical, APEV 035
8. Mounting plate, MPL 035
9. Single mounting plate, horizontal, APEH 035
10. Double mounting plate, vertical, APDV 035

Assembly system

Pillars, hard-chromium plated, ground

Area of application

For the assembly of GEMOTEC modular system units as well as for structures of all types in clean or contaminated environments. The many clamping elements permit numerous combinations of pillars and mounting plates.

Advantages – your benefits

Steel pillars
For a high degree of rigidity and low-vibration movements

Precise shape and positional tolerances
For high accuracy even for long pillars

Several pillar diameters
For minimum interfering contours of the entire system at optimal rigidity

Many clamping elements
Standardized, with a large variety of combinations possible

Assembly and centering bore holes
Reproducible, precisely angled assembly of the elements

General information about the series

Pillars
Steel, hard-chromium plated, ground

Sockets, mounting plates
Aluminum, anodized

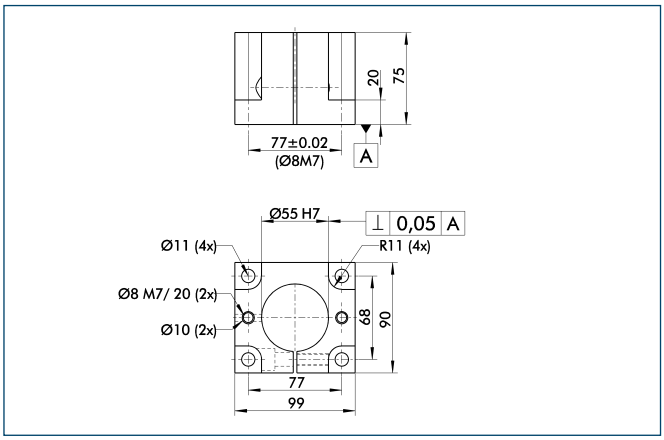
Scope of delivery
Including attachment screws

Warranty
24 months

For production reasons, the colors may vary from those shown in the catalog.

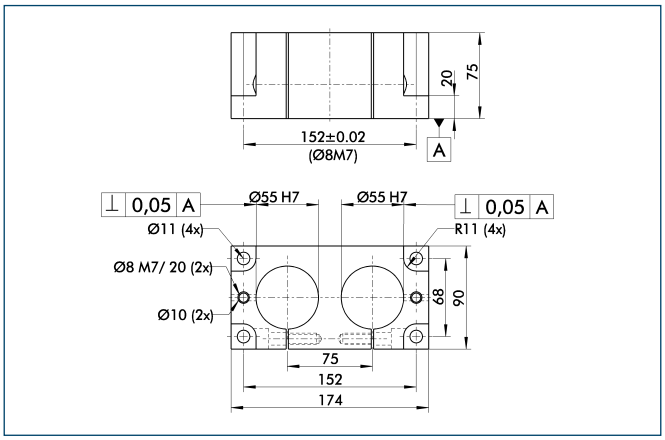
Pillar diameter, 55 mm

Single base support, SOE 055



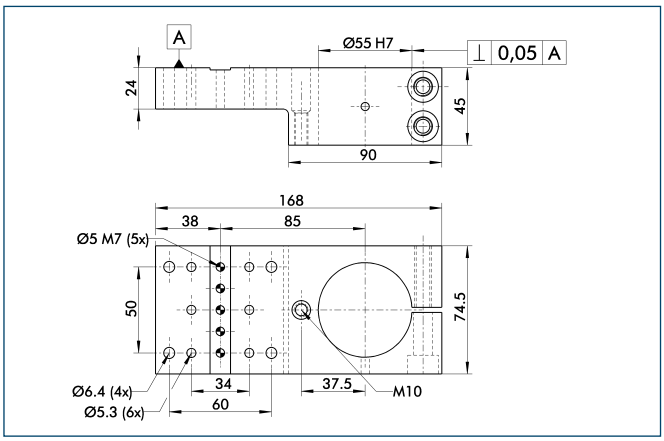
Designation	ID	Material
SOE 055	0313408	Aluminum

Double socket, SOD 055



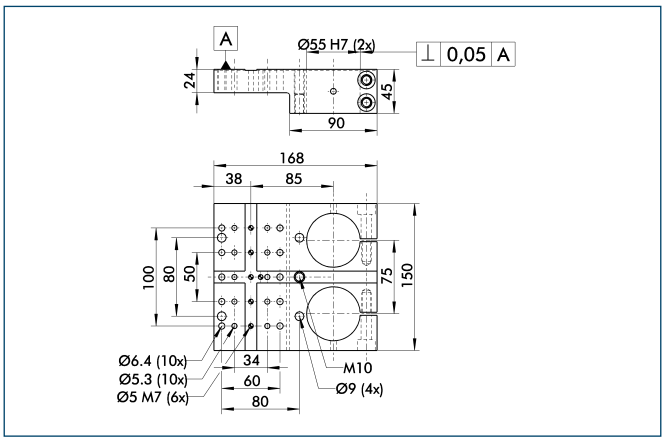
Designation	ID	Material
SOD 055	0313409	Aluminum

Single mounting plate, horizontal, APEH 085



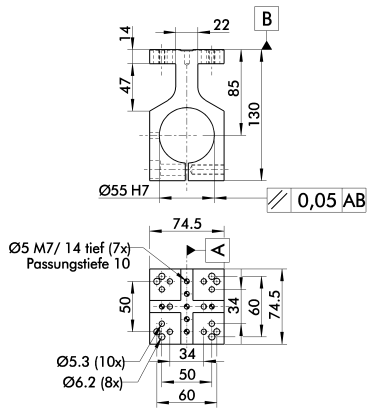
Designation	ID	Material
APEH 085	0313413	Aluminum

Double mounting plate, horizontal, APDH 085



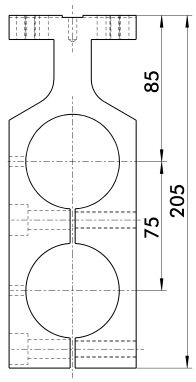
Designation	ID	Material
APDH 085	0313414	Aluminum

Single mounting plate, vertical, APEV 085



Designation	ID	Material
APEV 085	0313415	Aluminum

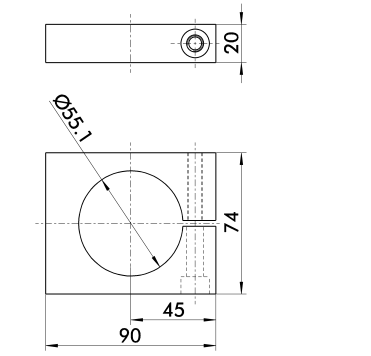
Double mounting plate, vertical, APDV 085



Missing dimensions: see APEV 035

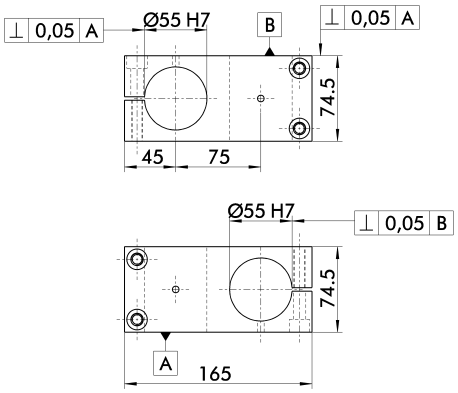
Designation	ID	Material
APDV 085	0313416	Aluminum

Set collar, STR 055



Designation	ID	Material
STR 055	0313417	Aluminum

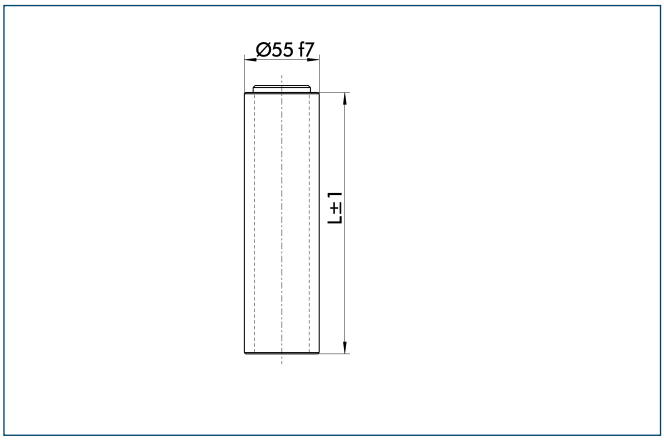
Cross connector, KVB 075



Designation	ID	Material
KVB 075	0313418	Aluminum

Pillar diameter, 55 mm

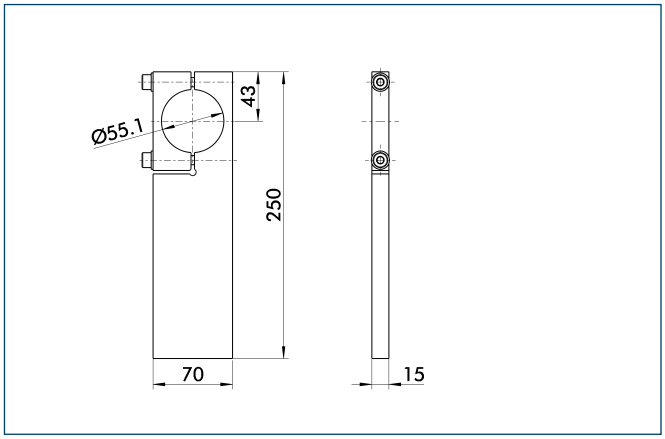
Hollow pillar, SLH 055



Designation	ID	Material	L [mm]
SLH 055-0150	0313700	Steel	150
SLH 055-0160	0313701	Steel	160
SLH 055-0170	0313702	Steel	170
SLH 055-0180	0313703	Steel	180
SLH 055-0190	0313704	Steel	190
SLH 055-0200	0313705	Steel	200
SLH 055-0210	0313706	Steel	210
SLH 055-0220	0313707	Steel	220
SLH 055-0230	0313708	Steel	230
SLH 055-0240	0313709	Steel	240
SLH 055-0250	0313710	Steel	250
SLH 055-0260	0313711	Steel	260
SLH 055-0270	0313712	Steel	270
SLH 055-0280	0313713	Steel	280
SLH 055-0290	0313714	Steel	290
SLH 055-0300	0313715	Steel	300
SLH 055-0310	0313716	Steel	310
SLH 055-0320	0313717	Steel	320
SLH 055-0330	0313718	Steel	330
SLH 055-0340	0313719	Steel	340
SLH 055-0350	0313720	Steel	350
SLH 055-0360	0313721	Steel	360
SLH 055-0370	0313722	Steel	370
SLH 055-0380	0313723	Steel	380
SLH 055-0390	0313724	Steel	390
SLH 055-0400	0313725	Steel	400
SLH 055-0410	0313726	Steel	410
SLH 055-0420	0313727	Steel	420
SLH 055-0430	0313728	Steel	430
SLH 055-0440	0313729	Steel	440
SLH 055-0450	0313730	Steel	450
SLH 055-0460	0313731	Steel	460
SLH 055-0470	0313732	Steel	470
SLH 055-0480	0313733	Steel	480
SLH 055-0490	0313734	Steel	490
SLH 055-0500	0313735	Steel	500
SLH 055-0510	0313736	Steel	510

Designation	ID	Material	L [mm]
SLH 055-0520	0313737	Steel	520
SLH 055-0530	0313738	Steel	530
SLH 055-0540	0313739	Steel	540
SLH 055-0550	0313740	Steel	550
SLH 055-0560	0313741	Steel	560
SLH 055-0570	0313742	Steel	570
SLH 055-0580	0313743	Steel	580
SLH 055-0590	0313744	Steel	590
SLH 055-0600	0313745	Steel	600
SLH 055-0610	0313746	Steel	610
SLH 055-0620	0313747	Steel	620
SLH 055-0630	0313748	Steel	630
SLH 055-0640	0313749	Steel	640
SLH 055-0650	0313750	Steel	650
SLH 055-0660	0313751	Steel	660
SLH 055-0670	0313752	Steel	670
SLH 055-0680	0313753	Steel	680
SLH 055-0690	0313754	Steel	690
SLH 055-0700	0313755	Steel	700
SLH 055-0710	0313756	Steel	710
SLH 055-0720	0313757	Steel	720
SLH 055-0730	0313758	Steel	730
SLH 055-0740	0313759	Steel	740
SLH 055-0750	0313760	Steel	750
SLH 055-0760	0313761	Steel	760
SLH 055-0770	0313762	Steel	770
SLH 055-0780	0313763	Steel	780
SLH 055-0790	0313764	Steel	790
SLH 055-0800	0313765	Steel	800
SLH 055-0810	0313766	Steel	810
SLH 055-0820	0313767	Steel	820
SLH 055-0830	0313768	Steel	830
SLH 055-0840	0313769	Steel	840
SLH 055-0850	0313770	Steel	850
SLH 055-0860	0313771	Steel	860
SLH 055-0870	0313772	Steel	870
SLH 055-0880	0313773	Steel	880

Mounting plate, MPL 250



Designation	ID	Material	L
			[mm]
SLH 055-0890	0313774	Steel	890
SLH 055-0900	0313775	Steel	900
SLH 055-0910	0313776	Steel	910
SLH 055-0920	0313777	Steel	920
SLH 055-0930	0313778	Steel	930
SLH 055-0940	0313779	Steel	940
SLH 055-0950	0313780	Steel	950
SLH 055-0960	0313781	Steel	960
SLH 055-0970	0313782	Steel	970
SLH 055-0980	0313783	Steel	980
SLH 055-0990	0313784	Steel	990
SLH 055-1000	0313785	Steel	1000

Designation	ID	Material
MPL 250	**0313419**	Aluminum